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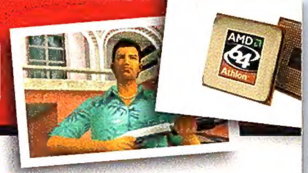

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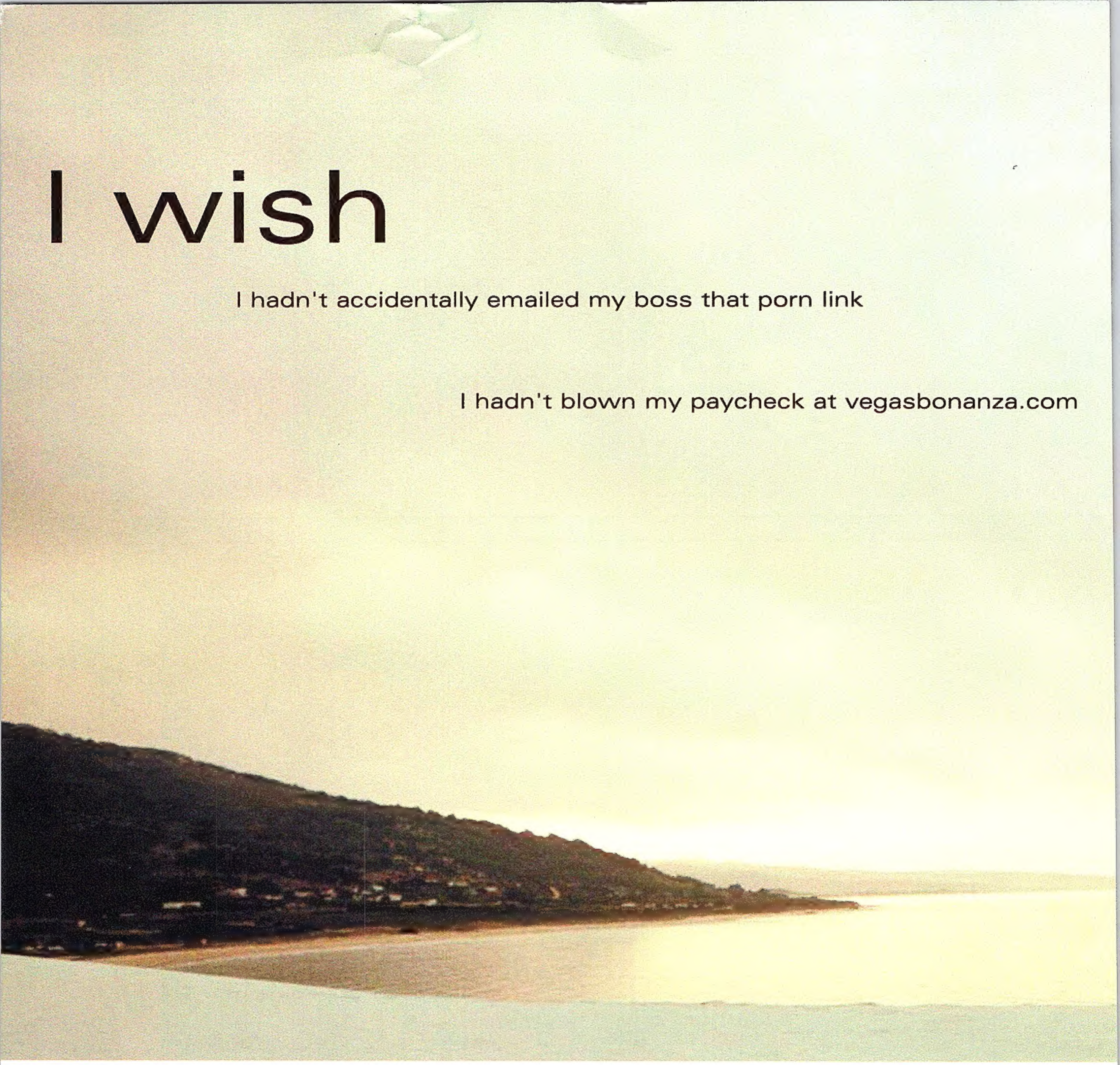
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I hadn't accidentally emailed my boss that porn link
I hadn't blown my paycheck at vegasbonanza.com

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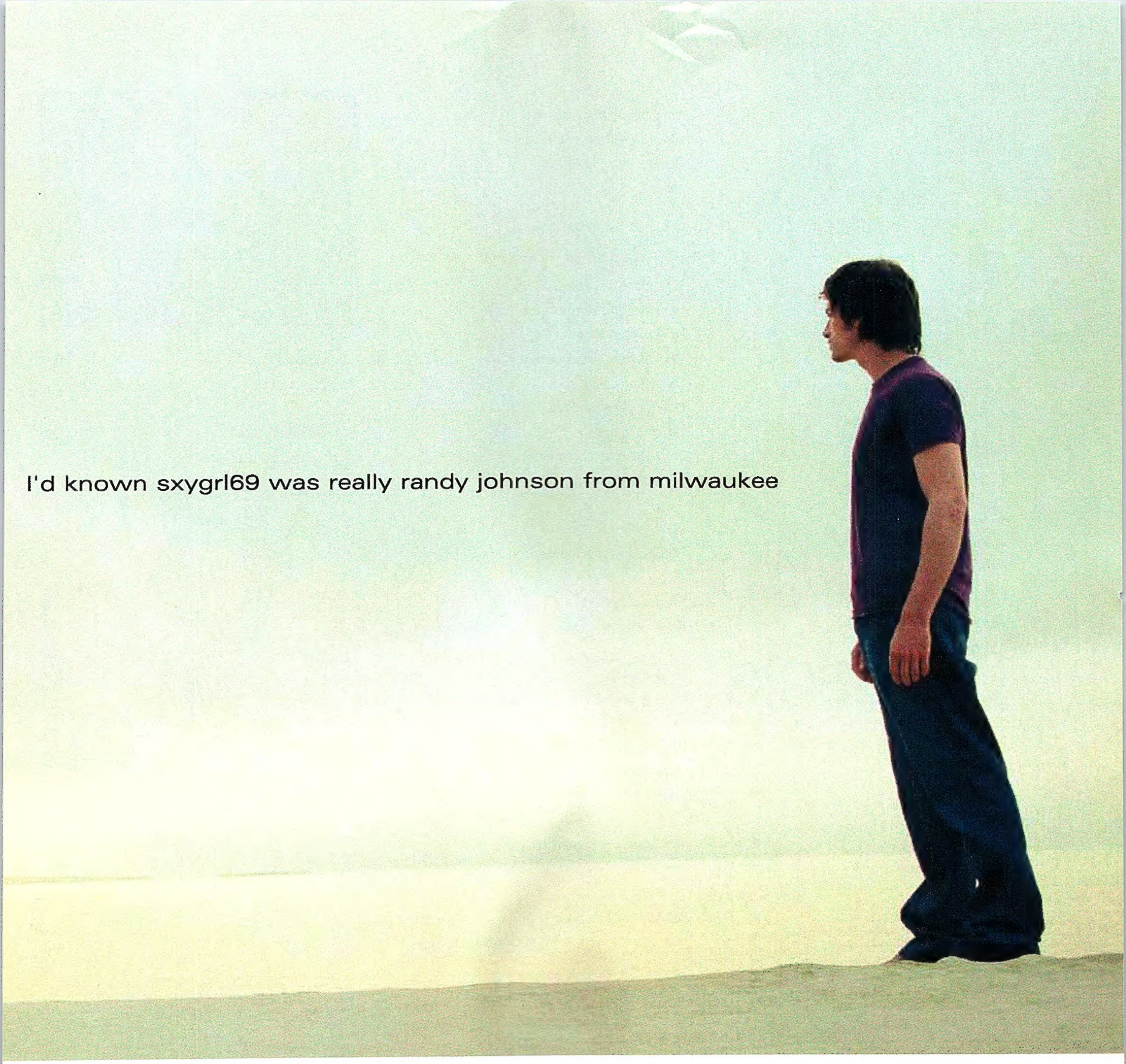
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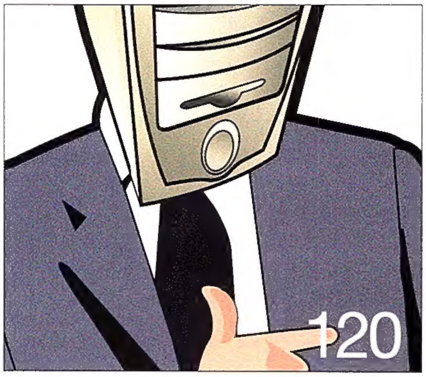
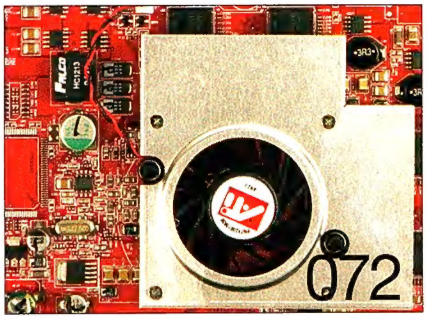
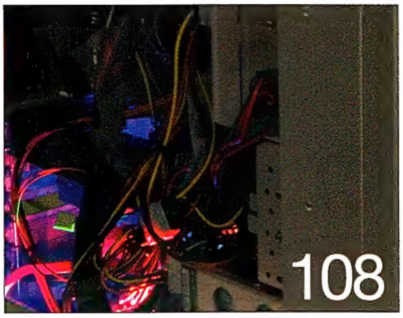


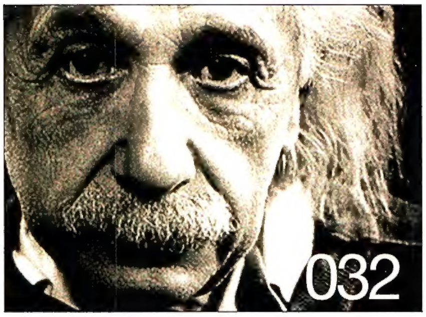
x-ray

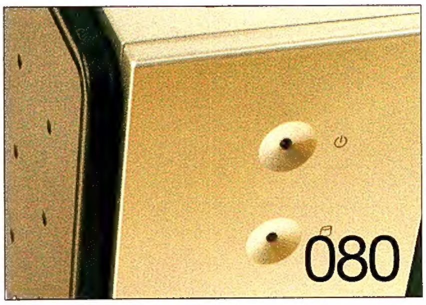
Quantum computing 032

Qubits and quarks. Well, qubits only, but quark is a nifty word to put into any sentence, just like quantum. Add it to the beginning of any word and it sounds amazing – for example, *Atomic* quantum captain Darren Ellis checks out the universe of the super small in a super big way. Time to pull out your microscope and go all science-like.









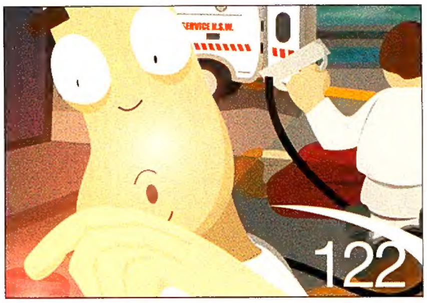
head to head Turn-based vs realtime 028

Have we reached the end of an era? Was there an era to begin with? There are many who debate that things are simply not what they once were, that our values have changed. That which we once appreciated is no more, replaced with the trivial fluff of today's world.

So, how exactly does this all relate to turn-based or realtime gaming? It relates in almost every way. If you think something is missing from recent games, then maybe this is it. Logan Booker goes all philosophical and investigates the past, present and future of gaming to discover why fast action games are slowly taking over the planet.

feature Full Steam ahead 030

Half-Life 2 has gone gold, Valve and Vivendi are primed and ready. Just about every gamer is on the edge of their seat – could the suspense be any more, er, suspenseful? Unlikely. On the eve of the release of what is said to be the best game ever, John Gillooly set out to deconstruct the backbone of it all. Find out the dramatic past that led Valve to create one of the most desired games of all time, and the online authentication and distribution system that lies at the heart of it all.



Critical mass

By the time you read this, large chunks of society will be grinding to a halt. Specifically, those parts which involve people like us – the people that keep our modern infrastructure functioning, the movers and shakers – the techs, geeks, and gamers with day jobs of this world. Especially the gamers.

For already GTA: San Andreas is on the shelves, as is the massively multiplayer e-crack of Everquest II (see *page 96* for a preview). And so is Microsoft's marketing-budget blowing Halo 2, which right now is giving Xbox gamers everywhere a renewed experience of RSI.

These titles, on their own, would be enough to induce fits of rapacious joy and cause even the most responsible gamer to ignore bodily functions. But as if that's not enough, as I speak, World of Warcraft and of course *The Game* – otherwise known by its production moniker 'Half Life 2' – will be tempting gamers all around the globe to sample new and delicious digital delights. It's as if the electronic entertainment industry has conspired to make the Earth stand still, and the month of November is critical mass. Let's hope the chaps who run our power stations aren't gamers and have abandoned their posts, or *none of us* will get to play.

Speaking of which, we're celebrating the final release of Half Life 2 by providing something a little different from the repetitive fare you'll read elsewhere – in true *Atomic* style we take a look behind the scenes and examine the tumultuous history of Valve and it how it came to create not only one of the most anticipated titles in gaming history, but also a revolutionary and controversial distribution mechanism called Steam. It all starts *page 40*. For the game itself you'll be able to read our thoughts online at www.atomicmpc.com.au by the time you read this.

Despite the decadence of gaming nirvana this month, our crowning masterpiece for this issue goes back to heart of what *Atomic* is all about – computing power, and lots of it. Nothing is more cutting edge, more revolutionary, and seriously cool as the coming of era of *quantum computing*. You think you've got a beast machine now? When the first commercial quantum computer arrives it will outperform every super computer that came before it, *combined*. Darren Ellis tackles the task of translating this remarkable technology into a geek-friendly form from *page 32*.

We've also crammed in the super-secret Encyclopedia Atomica this month that is, all on its own, a work of art from John. He made some mention about keeping this gold just for ourselves, but I laughed, and made a note when he wasn't looking to print this beauty for all to appreciate. That's on *page 45*.

This is just a sample of the fantastic issue we've worked hard to bring you this month, our biggest issue of the year. We do it because it's tech and games, because we love it, and ultimately because it's simply *Atomic*. Enjoy.

Ashton Mills
Editor

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MAXIMUM POWER COMPUTING

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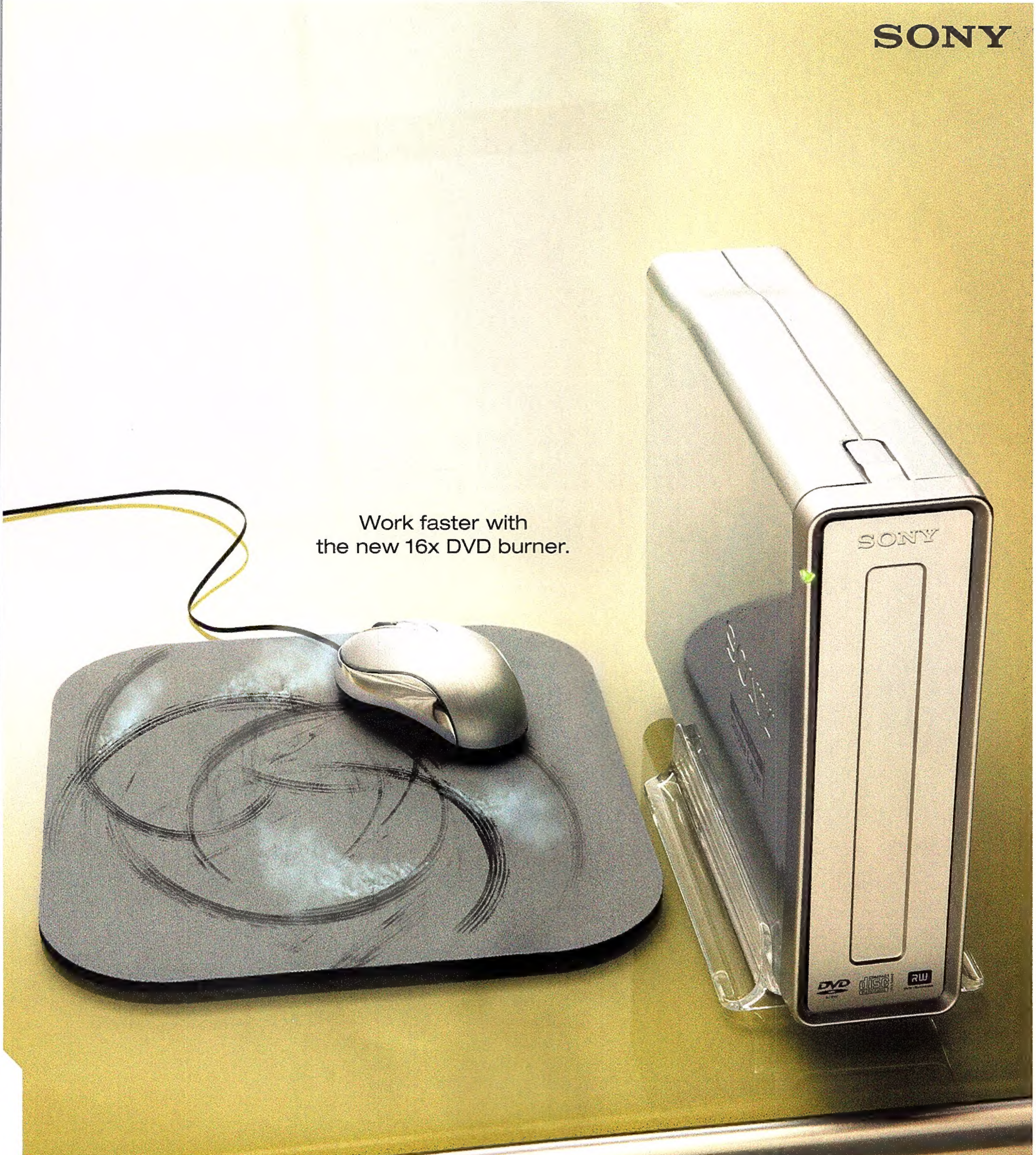

The one thing the new Sony 710 series won't burn is your time. With up to 16x burning speed, it's almost twice as fast as the previous Sony model. Available in internal IDE and external (USB2.0/i.link versions), it supports +/- formats and dual layer media. For information call 1300 13 SONY or visit sony.com.au

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CDGuide

The Bench Box

It's the world's best benchmarking tools packed on to the one CD. Never go searching for them again! Also this month: Computer Associates' e-Trust Antivirus with 90 days worth of free updates and virus definitions.

Benchmarks

If *Atomic* and 'benchmark' were both in the dictionary, they'd be self-referring. Actually, they do both appear in the dictionary, but it's not like we're happy they are there. We think the standard definitions are rather boring, so we set out, with this month's CD, to reinforce exactly what *Atomic* is about – hardcore tech. And nothing is more hardcore on the dancefloor than benchmarking.

So you'll find the best compendium of benchmarking tools on this issue's disc. It's packed, in fact, with the most tastiest, beautiful and accurate benchmarks available, and we're sure you won't be disappointed. They're quality tools for a quality crowd, and that crowd, amigos, is us.

Get hot and flustered with:

- 3DMark05
- BurnInTest
- PCMark04
- SiSoft Sandra 2004

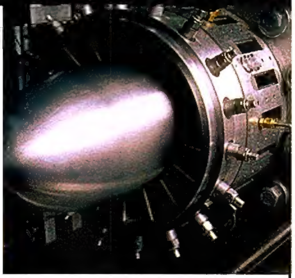
...and more!

e-Trust Antivirus

Anti-virus is so important these days. Just look at the latest headlines on your favourite news site – bet you anything there's a virus warning or exploit advisory. It's nuts! Nothing is safe – no program, no OS, not even your games! (Check out this month's Scanner for more information about that one.)

The only way you can be sure your box is safe is with active protection. *Atomic*, oddly, is not only about the more hardcore element of gaming, it's also about giving. In conjunction with Computer Associates, this month's CD has a special version of e-Trust Antivirus, which includes 90 days worth of updates and virus definitions. For zero bucks! Plenty of time to give it a go, and to keep your computer safe from harm in the meantime.

Compression tools



- 7-Zip
- WinAce
- WinRAR
- WinZip 9

Got an obsession with the compression? Then there's only one thing for it – archiving tools! This month we have the best and latest versions of the top compression utilities, including WinRAR and the open source 7-Zip. Try it out and see how small you can get your data. It's fun, really!

Miscellaneous

- Mozilla Firefox 1.0PR
- Adobe Acrobat Reader
- FileZilla 2.2.8d

Grab the latest versions of these tools on this month's CD. Mozilla Firefox for better, more secure browsing than Internet Explorer, Adobe Acrobat Reader to check out those nifty PDFs and FileZilla to update your website or to download the most up-to-date files from your favourite FTP site. All the goodness of miscellania!

Boot sector

Omega XP Catalysts 2.5.9.0
SiS Xabre drivers 3.57.53
SiS AGP drivers 1.17
VIA Hyperion 4in1s 4.53
SiS IDE drivers 2.04a
ATI XP Catalyst bundle 4.10
NVIDIA XP nForce drivers 4.27
NVIDIA XP ForceWare 61.76
Microsoft DirectX 9.0c
Intel chipset drivers 5.1.1.1002
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NVIDIA system utility 1.08
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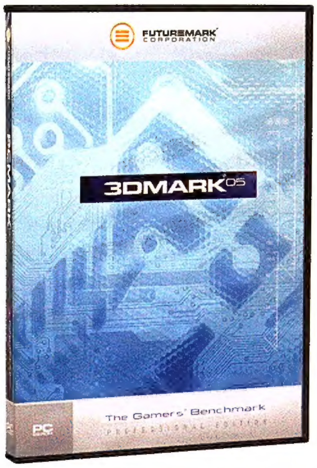
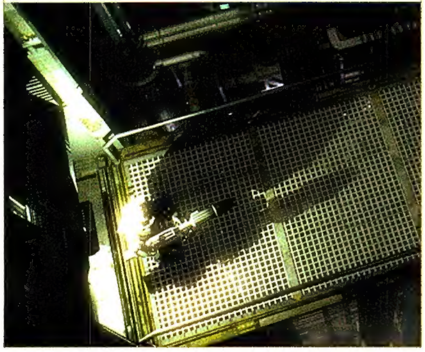
Creative Audigy drivers 4.0





News

ShortCircuits

Tabbed browsing apparently isn't so great if you want to keep your box secure. According to an advisory from security firm Secunia (www.secunia.com) the current selection of tabbed browsers, including Firefox, Opera and Konqueror, allow malicious users to capture data as it is being entered into forms.

The user is tricked into opening a 'hacked' tab before accessing the target site or form. Using JavaScript, data can be captured and sent to places other than its intended destination, said the advisory.

Never thought self-destructing DVDs would ever get off the ground? Well, a US company called Convex is attempting to get the technology into the mainstream with *Noel*, a cheap Christmas movie that will see its first release on the disposable media before it hits theatres. The self-annihilating DVDs, which will sell for US$5 a pop, work by becoming unreadable 48 hours after they are exposed to air – giving pirates oodles of time to rip themselves a copy.

Just as the base tech behind fuel cells is hitting a sort of maturity, researchers at the Georgia Institute of Technology have gone made their own power source by whacking a jet engine on a stack of silicon wafers. According to the Institute, the engine is not only efficient, it also produces enough useable energy to warrant further development.

A 5-megapixel camera on a mobile may be enough excitement for some, a camera with 'X-ray' capabilities is more tantalising. Japanese manufacturer Yamada Denshi has created a filter for Vodafone mobiles that has the odd side effect of making certain clothes – unintentionally, of course – transparent.

Big pixel phones

Why does Korea get all the luck?

Snap-happy Koreans will soon be able to enjoy the twin joys of talking on their mobiles and taking high-resolution digital photos when Samsung releases its S250; a state-of-the-art mobile phone equipped with a 5-megapixel CCD camera – the largest to ever appear on a mobile.

Unfortunately for us in Australia, and indeed the rest of the planet, S250 will only be available in Korea – although it's unlikely competitors will allow Samsung to run wild with its fancy new offering and models from other companies should appear in other territories sooner rather than later.

It was only a year ago that Samsung produced its first mobile featuring a 1-megapixel camera, and just three months ago a 3.2-megapixel model.

Adding to its multimedia capabilities, the S250 will feature an MP3 player, extensive support for mobile gaming, 92MB of on-board memory and 32MB of auxiliary RAM and a special 'QVGA' LCD capable of displaying 16 million colours, eclipsing the paltry 250,000-odd colour range on current mobile phones.

The device can also act as a camcorder, and can be readily connected to a TV to display images on the larger screen.

'It's very important to lead the trends through continuous introductions of innovative new products,' said Samsung CEO Kitae Lee. 'Samsung Electronics possesses the world's leading technologies and state-of-the-art design capabilities, and we are committed to developing innovative and distinctive products for our customers.'

The S250 will retail for around US$875 and will easily be one of the more expensive mobile phones on the market.

Samsung's SCH-S250 features a 5-megapixel camera. Shame it's only available in Korea.

Peltier my piece

AMD plans to go with hardcore cooling – on-die.

According to various sources, AMD may have plans to add on-die Peltier cooling to its CPUs – a result of work and research done on silicon-on-insulator, or SOI, technology.

A recent patent (#6,800,933) filed by AMD with US Patents Office shows that it's not just a rumour. Among the obligatory definitions and diagrams is an explanation of what it is all about.

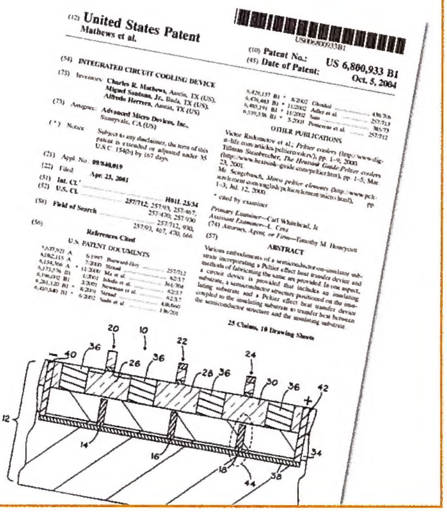
'Silicon-on-insulator ("SOI") substrates represent examples of such high thermal resistance structures ... A typical SOI substrate includes a plurality of silicon islands formed on an insulating layer, usually of oxide,' says the patent.

'Thus, thermal conduction from the device regions must proceed through the surrounding oxide. Since oxide has a coefficient of thermal conductivity that is as much a factor of one hundred smaller than silicon, the thermal resistance for a silicon-to-oxide pathway is much larger than a similar pathway through silicon alone.'

According to the patent, SOI allows denser packing of circuits and, as a result, an increase in heat production – not exactly a desirable side effect. Cooling will be crucial when chip manufacturers move to 65nm, and more importantly, dual core processors.

'The present invention is directed to overcoming or reducing the effects of one or more of the foregoing disadvantages,' the patent says.

The AMD patent in all its papery glory. The image details silicon-on-insulator and its heat-dissipating properties.



(12) United States Patent
Mathews et al.

(10) Patent No.: US 6,800,933 B1
(45) Date of Patent: Oct. 5, 2004

(54) INTEGRATED CIRCUIT COOLING DEVICE

(73) Assignee: Advanced Micro Devices, Inc., Sunnyvale, CA (US)

OTHER PUBLICATIONS

(56) References Cited

U.S. PATENT DOCUMENTS

(57) ABSTRACT

Various embodiments of a semiconductor-on-insulator substrate incorporating a Peltier effect heat transfer device and methods of fabricating the same are provided. In one aspect, a circuit device is provided that includes an insulating substrate, a semiconductor structure positioned on the insulating substrate and a Peltier effect heat transfer device coupled to the insulating substrate to transfer heat between the semiconductor structure and the insulating substrate.

25 Claims, 10 Drawing Sheets

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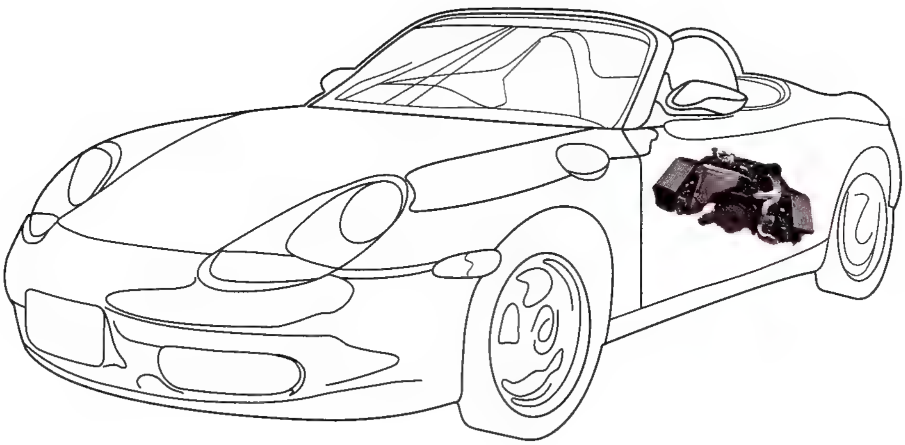
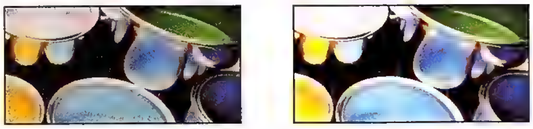


FROM ONE HIGH POWERED ENGINE TO ANOTHER.

*Real Colour Management



Before After

*Adaptive Colour, Contrast Enhancement

Before After

Introducing LG's Flatron f-Engine. The world's first picture enhancing chip for LCD monitors. Using DAFI (Digital Adaptive Fine Image) technology which includes RCM* (Real colour management) and ACCE* (Adaptive Colour, Contrast Enhancement), the f-Engine delivers fine colour, fine images and a fine view to your LG LCD monitor. So start your f-Engines. lge.com.au

LG
Life's Good

Tomorrow's Screen World

Dan Rutter takes aim at the state of screen technology, and wonders what the future will hold for us all.

Monitors have never been exactly a hive of innovation compared with the rest of the PC market.

First, there were CRTs that cost so much that a 17-incher was luxury. Then there were CRTs cheap enough that 19-inchers sprouted on half of the world's desks. Around the same time, there were LCDs whose price/performance ratio was dreadful. And now better, cheaper LCDs are in the process of eating the whole mainstream display market.

The big consumer CRT-monitor market, in particular, now hardly even exists any more. I recently had the joy of waiting *months* for one solitary 21-inch Samsung SyncMaster 1100p Plus to be shipped to Australia for me.

And that's about it. I've just described the last 20 years of PC display development. It would take me a wee bit longer to do the same thing for CPUs.

We're all, of course, hungry for something new and thrilling to replace LCD and CRT, if only so we can have that cool witchcrafty feeling that only comes from using things that couldn't be bought at any price 10 years ago.

Unfortunately, besides a couple of possibly nifty LCD variants, our hunger looks set to continue for a while yet.

Everybody got all hot and bothered about Organic Light Emitting Diode (OLED) screens a year or three ago, but the darn things still don't seem to last much longer than 2000 hours. Which is a bit of a problem. We can already make desktop-sized OLED screens, as well as the tiny ones you can buy on some phones and cameras and MP3 players today, but nobody wants to make desktop OLEDs if the things can still be expected to die in one year if you use them for around five hours a day.

Plasma, in case you're wondering, isn't likely to ever make an impact in the PC display market. The problem there is that the 'feature size' is too big; nobody can make a plasma panel with pixels anything like as small as you need for a computer monitor. And dearly though we'd all like a *huge* big-pixelled PC-resolution plasma to use from a bit further away than a regular monitor, we probably don't want to pay $50,000 for it.

So that's the bad news. But don't panic just yet – a couple of other technologies are looking rather interesting.

First up, there's Surface-conduction Electron-emitter Display, mercifully abbreviated 'SED'. It's a phosphor-coated screen with a vacuum behind it, like a CRT, but it's got hard pixels each made up of three rectangular subpixels, like an LCD. Each subpixel has its own tiny low voltage electron emitter right behind it, instead of being scanned by a magnetically-guided high voltage electron beam from afar, as you get with a conventional CRT.

> Everybody got all hot and bothered about OLED screens a year or three ago but the darn things still don't seem to last much longer than 2000 hours

SED offers high brightness and a great contrast ratio, like a CRT, but in a hang-on-the-wall form factor, like plasma, and with power consumption around that of LCDs. CRTs draw about twice as much juice for a given screen size, and plasma screens are even worse, which is why they need cooling fans.

The first Toshiba (co-developed with Canon) SED HDTVs will be hitting the market Real Soon Now for you've-got-to-be-kidding prices. But only 10 years ago a VGA (640 by 480, *sixteen colour* active matrix LCD monitor could easily set you back $5000, so SED TVs ought to sprout in ordinary homes soon enough.

And, unlike plasma, SED can go small. The smallest prototype SED electron emitters anybody's managed to make so far are only a few nanometres across. An emitter is not a subpixel; add a control matrix and phosphor blobs and things get much bigger.

But when you consider that the high density 1680 by 1050 WSXGA widescreen display on that phunkalicious new aircraft-carrier 17-inch notebook of yours is made out of subpixels that're about *seventy-three thousand* nanometres wide, I think you can see SED's potential.

And then, there are projectors.

What's the big problem with today's relatively cheap, highly portable, long-lamp-life front projectors?

They don't work well when the lights are on, that's what. The picture goes an annoying shade of grey.

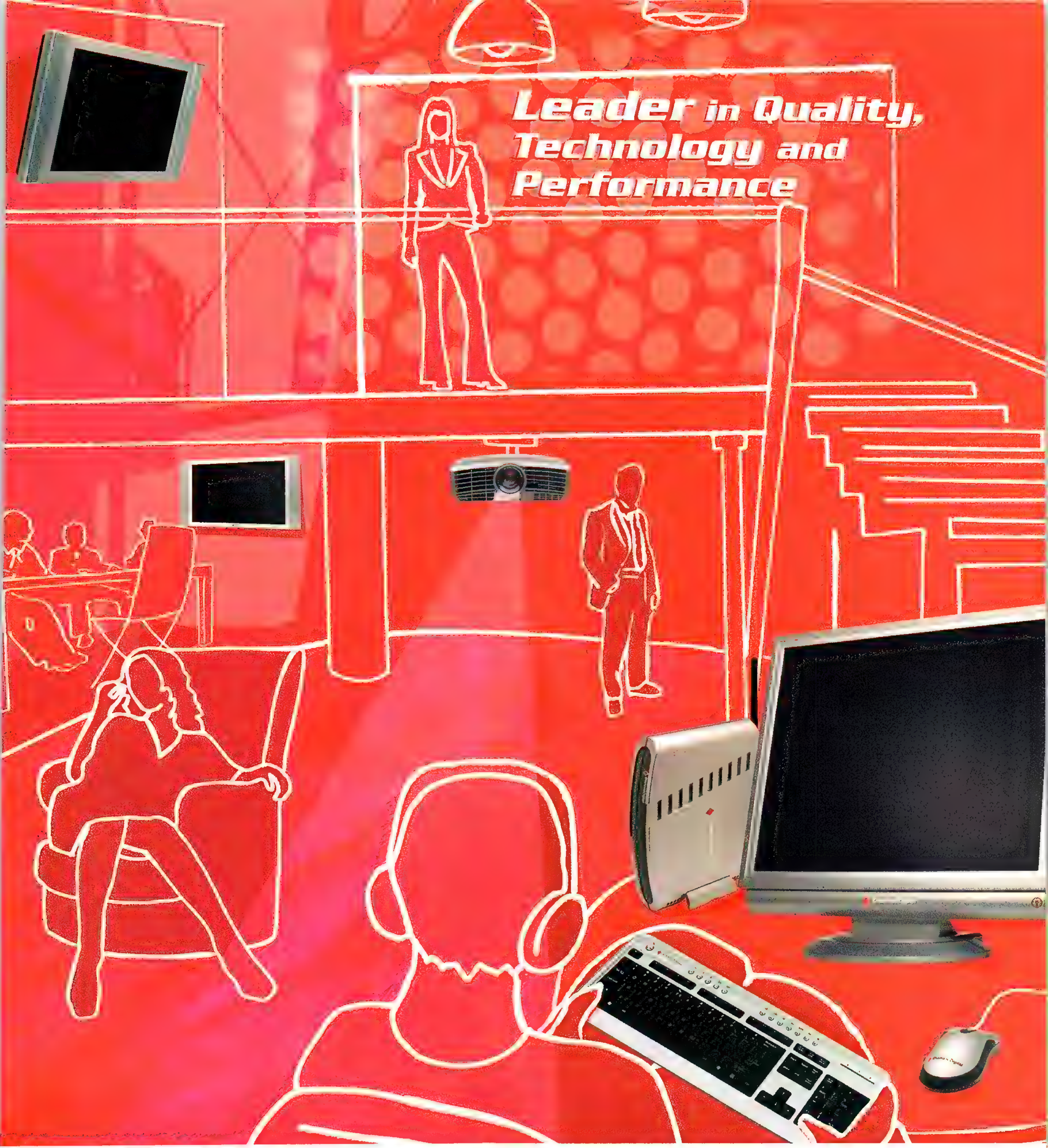
But somebody at Sony had a thought.

That thought was: 'Hey, video projectors only spit out three colours of light, right? Narrow-band red, green and blue? How about we make a projector screen that's got filters over it that only let those narrow bands through? Wouldn't that give you a screen that reflects very little ambient light – only the light that falls in those three narrow bands – but lights up all bright and magical when you point a projector at it?'

Yes, it would, and yes, it does, and Sony and whatever other companies license or rip off the idea ought to have the new 'dark screens' (Sony calls theirs the 'Hi-Contrast Screen') on the market pretty soon. They're certain to cost a lot more than a secondhand garage sale slide projector screen, and they don't *totally* cure the ambient light problem, but they come so close that you really will be able to use a front projector for ordinary everyday TV watching as well as dim-the-lights movies.

For everyday computing, not so much – but for games, hell yeah! (And that's a technical term.)

So take heart, fellow screen-starers. With super-contrast screens for our projectors, and SED monitors that shouldn't break a sweat displaying 6400 by 4800 (that's about print resolution on a 20-inch screen), the future looks not just bright, it also looks smooth and a little bit contrasty.



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Robot wars

Ben Mansill thinks the next generation of combat aircraft will be the last generation of jet fighter pilots.

A couple of decades ago, during the adolescent phase of my ongoing growing-up adventure, I looked forward to living my dream. With the cheerful optimism of youth I ignored my mother's pleas to be sensible and study a trade. I knew what I was going to be (if 'ignoring mother' was an actual job, I was already well qualified).

TV kept trying to tell me that, increasingly, computers and machines were replacing the jobs people do. Sucks to being a production line auto assembly worker, then, because I was headed for grander adventures! I was going to be a jet fighter pilot!

As it turns out, mother was wrong and TV was right. This was a valuable lesson in itself. Teaching me, among other things, that TV could be a creator and destroyer of dreams.

Well, it turned out to be inconsequential. For me, video games came along and interrupted the hard work needed for serious career pursuing. I lucked out and managed to build a professional life around computer games. Ha! Go fate!

But my little fantasy isn't uncommon. What's not to love about jet fighters? It has always been rather nice that governments have spent schmillions of dollars designing and building sports cars of the air for a lucky few to fly? Fighter planes have always embodied the ultimate in cool technology.

If you are reading this and happen to share the dream of flying hell-sexy combat planes – get serious and bloody well do it. Because you belong to the last generation of jet fighter pilots.

Soon, humans will no longer experience the exhilaration of burning to death at mach 2, or ejecting into the waiting arms of torturers, or living with the guilt of accidentally laying waste to a wedding party. UAV's (Unmanned Air Vehicles) are the future, and they're already here.

It's highly desirable to get the human out of the cockpit and replace him (or her) completely with computers. A computer-flown combat plane is better and cheaper, smaller and lighter. Take a human out of the cockpit and, for starters, you no longer need the big and heavy cockpit itself, and all the gear humans need to stay alive and interface with the plane. Ejection seats are heavy and expensive! UAVs can pull whatever manoeuvre the airframe can handle while humans go all squishy anywhere near 9gs. Computers can stay in the air as long as there's a refueller around. Computers don't need extensive and ongoing training, or support logistics, or bathroom breaks. They don't answer back. They are, if needed to be, expendable. UAVs are smaller, so you can pack more onto an aircraft carrier. What's not to love about UAVs?

Computers don't need extensive and ongoing training, or support logistics, or bathroom breaks. They don't answer back. They are expendable.

The quest began during WWII, with crude radio-guided cruise missiles, and has been pursued in earnest ever since. Building a computer that can fly and fight is complicated, so early UAV research focussed on reconnaissance duties. Which is nice. Recon is a boring and dangerous job anyway. When Francis Gary Powers' U2 was shot down over Russia the impetus was redoubled, although it turned out that satellites did a better job for that particular enemy, and his huge and well defended land mass. The Israelis did make clever use of simple technology during the Six Day War, sending a group of small and slow prop-driven UAVs towards enemy SAMs. They emitted signals which fooled the enemy radar into thinking they were in fact large combat aircraft. The baddies turned on their radars, which were promptly wiped out by the squadron of real fighters flying in behind the UAVs at low altitude. Clever buggers in desperate times can do impressive things.

UAVs haven't been anything more than very large model planes thus far. Either radio controlled from a ground operator, or autonomously following set waypoints, they have been camera ships and little else. That changed in Afghanistan when the yanks strapped a couple of Hellfires to some Predators. The next generation of combat pilot was born. Sitting in a caravan hundreds of miles from the action in front of what could pass as PC flight sim screens, but the plane was real and so were the targets.

But Generals want more than a low and slow prop-driven Predator. They want fast jets. The US is, unsurprisingly, pursuing UCAVs (Unmanned Combat Air Vehicles) with vigour. Boeing and Northrop are developing prototypes. They are stealthy, small, and they, or their offspring will likely be the next front line American fighters.

The modern battlefield is already highly computerised – and networked. A squadron of UAVs are a network, which means orders of magnitude improvements in efficiency and effectiveness. In Australia the Defence Science and Technology Organisation (DSTO) is working on 'swarm' technology, where dozens or even hundreds of small and cheap UAVs would be used for surveillance of possible enemy activity, or as small weapons carriers. Different UAVs with clear functions would work efficiently together, multiplying their individual effectiveness, yet able to react swiftly to unexpected scenarios and provide redundancy.

It's probable that the F/A-22 and JSF will be America's last manned fighters. Other countries are moving too, but not at the pace of the Americans. That raises the likelihood of air-to-air combat between UCAVs and piloted fighters in the future. Unfair? Well, who said war ever was a fair fight? Indeed, the science fiction scenario of swarms of UCAVs engaged against each other, fighting to win peace for we humans, is all but certain.

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The force is weak with this one

Tim Dean is a very happy person – except when it comes to the *Star Wars* DVDs, in which case he's the paragon of pissed off.

I wouldn't be surprised if regular readers of this column believe I am an angry man. In fact, I'm not. I'm generally a very happy and contented person. I think it has something to do with learning at a young age that lying on the grass and staring at cloud formations was far more fun than playing soccer – much to the chagrin of my family and the rest of my team.

Then again, I'm a Scorpio (not that I believe a word of it). As such, while apparently I have a high threshold for tolerance, when tripped, I'll unleash a torrent of fury. Though I place little stock in the likelihood of the positions of heavenly bodies at the time of my birth in determining my personality, this seems strangely accurate.

Casting back to when I was a wee nipper again, I recall that some of my most potent memories as a child were cases of injustice. Things like having the person next to you whisper something to you during a test, only to have the teacher point at you and have you finish the paper in the hallway. Or things like having the coach of your team threaten grievous physical and psychological harm if you don't get off you arse and stop staring at clouds, and run off and tackle some other poor sap who's having a great ol' time barrelling towards your goal. It's that kind of injustice that makes me mad.

As such, there are a few things in this world that undoubtedly trip over my threshold and make me see red – or as I like to call it: imbue me with righteous fury. You know, that table-tipping-over, arm waving, ranting kind of fury that gives you a kind of *petit mort* afterwards. The list of fury-inspirers is not long, but it includes choice mentions like George W Bush, Monarchists, religious extremists, corrupt African governments and Krispy Kreme.

The last may surprise some of those who know me well, especially after they've seen me hoard an entire box of the original glazed numbers and quietly content myself to gorge on them with an appropriately 'glazed' look in my eyes. In many ways, that's the closest I've been to nirvana (beef madras with green chilli pickle not withstanding).

However, I reserve some of my bitterest rage for the cretins at Krispy Kreme HQ – not for the quality of their product, which I consider to be consistently exemplary – but for the fact that the bastards have only six stores in Sydney. Now, what kind of person would do that? What kind of black-hearted fiend would unleash doughnuts, formed from heavenly ambrosia itself, into the city of my residence, and NOT open more stores in my general vicinity. The nerve! The guile! Whoa, I have to stop writing about KK or I'm going to rupture something – not necessarily something of mine either.

> If you don't mind me saying: bugger video. Bugger it far and wide. I want DVD.

So, I'll move on to another candidate on my fury list: George Lucas. As you can tell from this column, I have many fond memories of childhood (as well as a few rage-filled ones). One of the fonder memories is of the time I spent enveloped in *Star Wars*. That time went from somewhere around the age of four to, oh, about 25 old. Then something went wrong. And by 'something', I mean George Lucas.

I'm not afraid to say I thought Episode 1 and 2 were garbage. If I had never heard of *Star Wars*, and I went to see them, I'd be mildly interested in some of the effects, perhaps the feeling of a greater world going on in the background, but I'd rapidly forget the movies due to the bad scripts, weak stories and wooden acting. But hey, I can get over that. I just don't have to watch those films again. Easy. Rage abated.

However, apparently now I'm told I'm not allowed to watch the original films I love so much. Nup. Not unless I want to dig out my old videos. Here comes the righteous fury...

If you don't mind me saying: bugger video. Bugger it far and wide. I want DVD. And I don't think it's unreasonable to expect, nay, demand it.

But apparently, along with four extra chins, George has gained a tremendous amount of contempt for his original fans over the last 25 odd years.

Oh, and he's also lost his mind – an unfortunate combination at best.

So now we have these bastardised versions of the original films on DVD. Hey, some people might love them, and more power to them. People like that probably also like Krispy Kreme's franchising policy too. Bless 'em.

I don't want the films that George 'wanted' to make. I mean, really – if today's versions are the ones he wanted all along, I'm damn sure they wouldn't have been as successful as they were.

It's like if Beethoven had always wanted a mouth harp solo in the middle of the *Moonlight Sonata*. Sure, he could have dubbed one in later when the technology became available, but I don't doubt it would have buggered the magic. Or what if Orson Wells really wanted *Citizen Kane* in colour? He could have colourised it in the '70s... you get my drift.

When it comes to some of the changes, they don't even add anything to the original films. Things like redubbing Boba Fett's voice with that of Temura Morrison, who played Jango Fett in Episode 2.

Hey, I'm all for the concept that behind the armoured helmets of the clones reside 'fruzzbee' throwing, 'fush and chups' eaters with 'chully buns' – but does it really add anything to the earlier films to revise them this way?

It might be more consistent, but all it does for me is jolt me out of my viewing experience – and that's one of the golden rules of cinema: that if something production-wise is noticed, then it's bad.

And then there's the issue of Han shooting first. George... do I really need to explain to you why you wrote that scene that way in the first place? Evidently so...

And the thing that really pickles my gherkin – both George and I know that I'm going to buy the damn bastardised DVDs despite my abundant fury.

George 1, Tim 0.

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GEARBOX

1 Logitech Cordless Rumblepad 2

Supplier: Logitech
Website: www.logitech.com
Phone: (02) 9972 3711 **Price:** $79

With a design almost exact to that of the standard Playstation 2 controller, it's an instant winner for those in need of a decent PC game controller. It's actually a tad heavier but the design and location of the wing buttons have been tweaked, allowing lower and easier access to the four rear buttons and a slightly deeper hand-hugging design. If that doesn't press your buttons, consider that it's a feisty handful of vibrating, 2.4GHz wireless PC gaming love.

1

3 ReZAP Battery Doctor

Supplier: Digital Works
Website: www.rezap.com.au
Phone: (03) 9558 5880 **Price:** $79.95

Forget what your parents told you about batteries. Well, no, don't eat them, recharge them. On top of the usual Ni-Cad, Ni-MH and RAM support, this five-in-one multi-chemistry testing and charging box feeds life back to alkaline and titanium cells.
If faulty, it'll reject them thanks to the safety checks it performs and it won't touch carbon, so forget the heavy duties, otherwise it'll pump in the lurv.

Fitting practically any house battery, this is a superb doohickie.

3

2

2 Super Flower SF-609

Supplier: Cam1 Computer Wholesale
Website: www.cam1.com.au
Phone: (02) 9999 5600 **Price:** $59

The blasted heated weather is back upon our sorry arses, so what better way to treat your case than kitting it out with more time-space bending fans and (perhaps another) rheobus. This one has four potentiometers for adjusting the fan speed and three buttons below its RPM-displaying LCD for cycling through four temperature probes.

This baby also comes with five additional changeable face plates depending on your colour mood. Windy goodness.

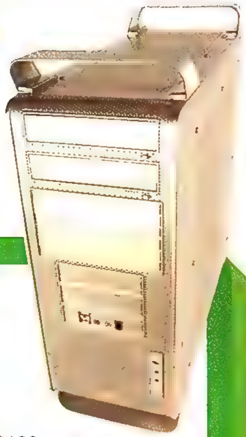
4

4 Steel Cord Holder

Supplier: Steelpad
Website: www.steelpad.com
Phone: N/A **Price:** US$16.50

For a non-heatsink this is one of the handiest 200g lumps of metal we have used. Steelpad's Cord Holder is a widget for holding your mouse cord in place, and it is the perfect dovetailing of simplicity and practicality.

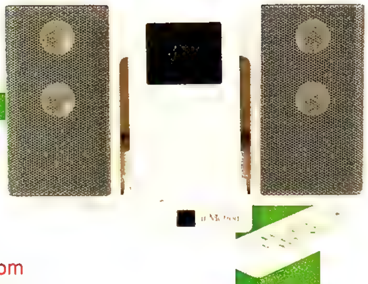
It just works, simply run your mouse cable through the groove on the weight, tighten the screw to secure it and enjoy mousing without struggling to keep the cable from snaking away from you. This baby is pure brilliance.



5 FSP-7103H case

Supplier: Anyware
Website: www.anyware.com.au
Phone: (07) 3856 3999 **Price:** $189

Almost like some special room ventilator, this case is riddled with holes and is basically a more affordable look-a-like case of the Lian Li PC-V1000. Only it doesn't come with any fans. Or a PSU. Air supply certainly isn't a problem, but for better airflow, fans are recommended to remove the stagnant hot air. Inside, it's a stock-standard design except all the bays all have screwless entry. With two stealth CD drive bays and rubber footing, it's not overly cheap, but it's a great looking alternative.



6 Altec Lansing inMotion iM3

Supplier: Audion
Website: www.audion-mm.com
Phone: 1300 300 364 **Price:** $349

Altec Lansing's latest addition to kitchen white electronica is a neat powered portable speaker system designed for the ineffable iPod. Sporting an Apple-esque look, and four quality 28mm neodymium speakers, this kit is actually quite awesome. The small speakers fall down on bass, but the mid and high range is crisp and clear, and it belts out your favourite pop to an astoundingly high volume. With svelte carrycase, and clips to work with iPods, it's a neat solution for the road or office.

7 Smart-Guard PC Lock

Supplier: PC Case Gear
Website: www.pccasegear.com.au
Phone: (03) 9584 7266 **Price:** $79

This USB device is a nifty key if you have kids with the ability to lock Windows and perform some other basic restrictions. Basically, what you can already do with Windows policies, but on a stick. The target audience is limited a bit though. The annoying thing is it just won't function unless Internet Explorer is set as the default browser because of the bizarre IE-based installation procedure. It is possible an IE user just might find this a godsend.

8 Optical Mouse by S+arck

Supplier: Microsoft
Website: www.microsoft.com.au
Phone: 13 20 58 **Price:** $59.95

With the look of a *Star Trek* pleasure device, this two button designer scroll mouse weirded us out. It was designed with simplicity in mind; alas the two side buttons are actually not that. They just *look* good, as does the light down the middle. It was a tad small and barely curved enough to hug our hands, but perhaps we're just too unco or un-arty for such sophisticated devices. It's an optical mouse for yuppies with small hands.

9 Zensonic Z710 Wireless Headphones

Supplier: Zensonic
Website: www.zensonic.com
Phone: 1300 762 192 **Price:** $89

For this price range, these circumaural headphones would have to be the best pair of wireless ear blasters we've jacked-in to. Sporting the standard frequency range of 20Hz-20KHz, there is a decent amount of kick in the bass but there is a noticeable lacking in the treble. Nonetheless, sitting at 815MHz, the reception on these is simply incredible, as we were able to monkey around the office with seemingly no change in signal strength.

10 Thermaltake Purepower TWV480

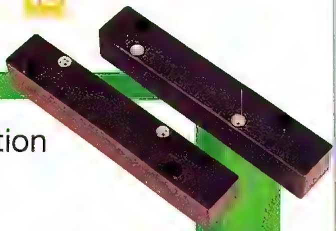
Supplier: Thermaltake
Website: www.thermaltake.com.au
Phone: (03) 9763 1622 **Price:** $199

Apart from the ATX 20-24 pin adaptor and 80mm case fan, this PSU comes boxed with a mighty useful rheobus. Not only does it control the speeds of the two PSU fans, it has an inbuilt red LED display unit which shows how much juice your system is dragging down the pipe. This is a great idea if you're too lazy to be bothered to manually figure out the theoretical approximate. Nine Molex, two SATA and two floppy connectors later, and this 480W PSU will keep your system happy.

11 Sitecom USB 2.0 Universal Dock

Supplier: Anyware
Website: www.anyware.com.au
Phone: (07) 3856 3999 **Price:** $195

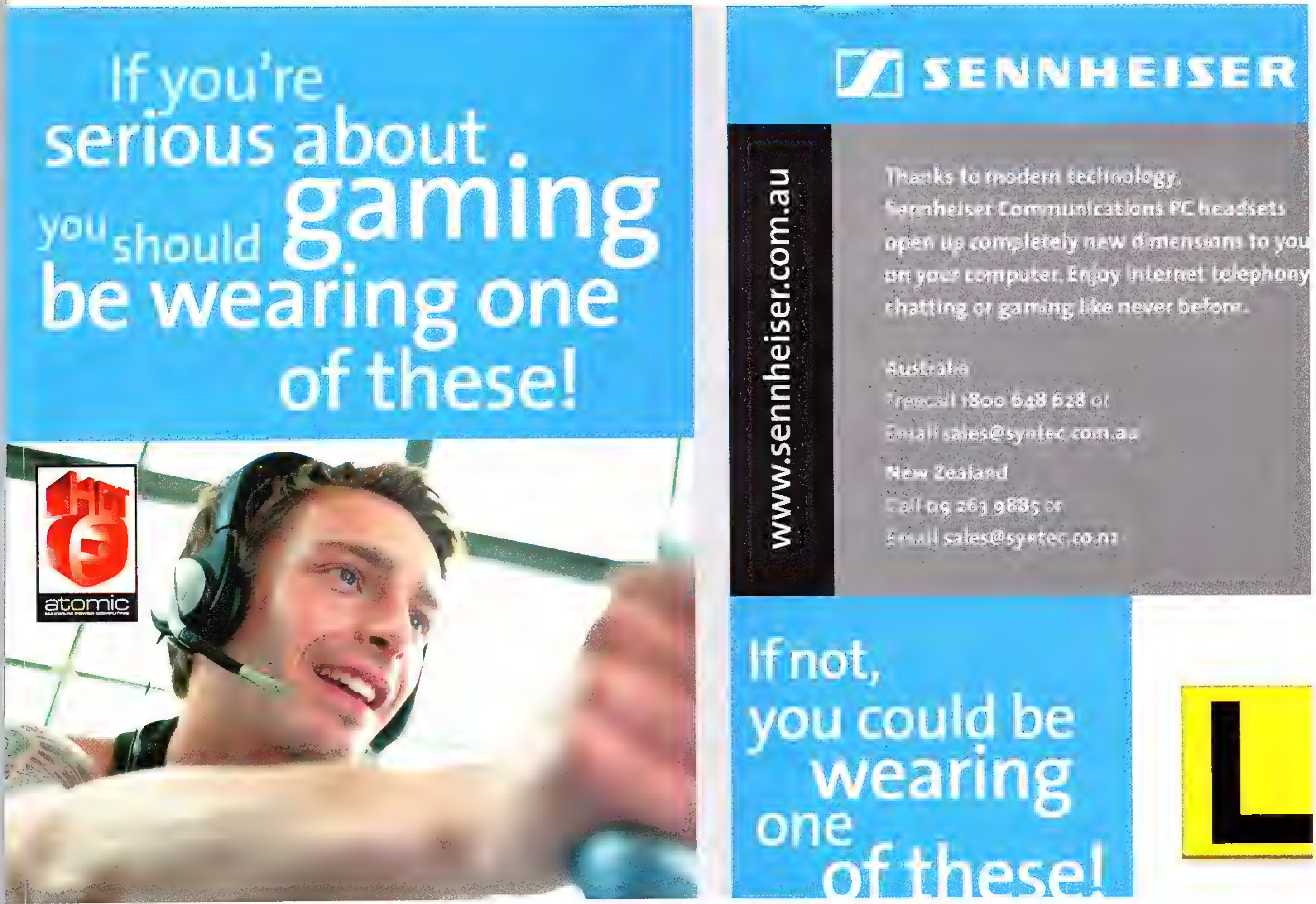
You could be surprised by what you find on this. Only, we're going to tell you, but that doesn't change anything. Once fired up, this central mega-device-hub contains a VGA port (albeit 1024x768 at 16-bits), a serial port, separate mouse and keyboard PS/2 ports, three USB 2.0 ports and a 10/100Mb/s Ethernet port. What's incredible is all of these devices are detected and controlled via a single USB 2.0 connection – with no use of pass-throughs. Ingenious for those on the go.



12 Hard Drive Vibration Dampener

Supplier: PC Case Gear
Website: www.pccasegear.com.au
Phone: (03) 9584 7266 **Price:** $9.90

Give me those vibrations! That is, at least, what this kit is saying to you. With components dropping further away from sonic boom, the presence of HDDs is increasingly more obvious. And we can't have anyone knowing you have HDDs. You'll need to sacrifice a 51/4in drive bay, but with the decrease in volume and knowing that no one else can tell there's a 31/2in HDD in there, it's worth it. Unless it's already driven you mad, in which case flip the mag upside down and read this again, foo.


If you're serious about gaming you should be wearing one of these!
HOT atomic
If not, you could be wearing one of these!
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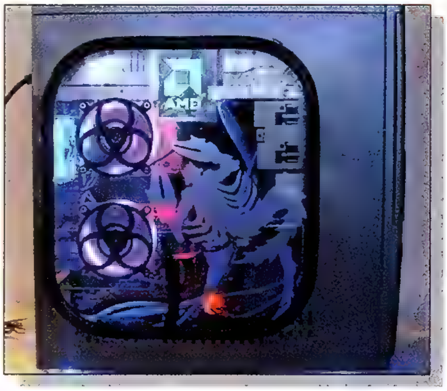


Technical details

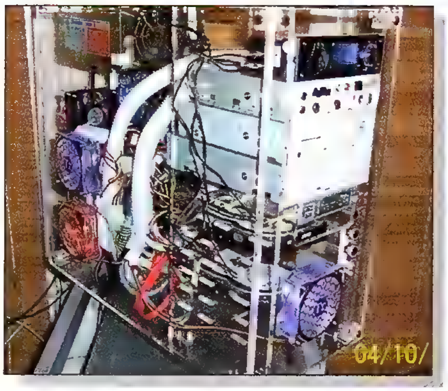
- AMD XP BARTON 3200+ @ 2.6
- ABIT NF7-Sv2 MOBO
- GeXcube RADEON 9600XT 128MB
- 512MB RAM DDR400
- Seagate 120GB HD 8MB
- Thermaltake Tower 112 cooler
- CM Cool drive 4 and Aero gate 2
- Sunbeam fan controller
- Six case fans with 120mm metal fan
- Biohazard fan grills, two UV grills
- Antec case modded window
- 14 case badges and scorpion W/app

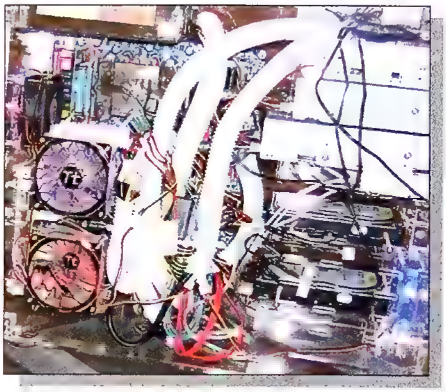
With all case modding these days, nearly everyone can add a window and a neon light. So when I got my standard Antec case I wanted to do something that would make it stand out from the rest.

The first thing I did to make the design unique was tackle the issue of accessibility. The case is restricted to only having one side removable. Another thing that did standout was the PC Tacho made by Xoxide, which made for a great feature for the case. When I got my GeXcube VGA it came standard with a cool looking tri-coloured fan on the heatsink, which I soon replaced with an Artic cooling kit. I thought the fan was way too cool just to have sitting around so I replaced the NorthBridge fan with the tri-coloured fan. With its lights flashing in patterns it looks awesome.

Special thanks to Sam at Tasmanian Principal Computing, Pc Case Gear and friends.

Tom's Chick Magnet





Technical details

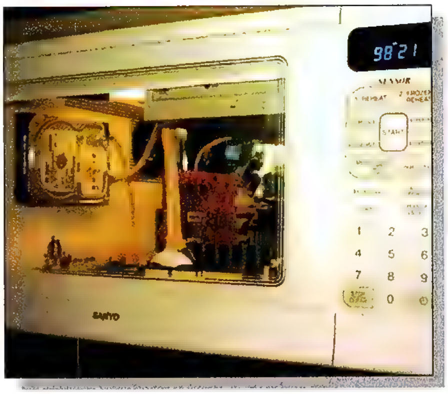
- P4 3.6GHz 1M cache, socket 775
- Thermaltake Aquarius 3 water cooler
- Gigabyte GA 8ANXP mobo
- Two Corsair XMS2 1GB DDR2 675MHz Twin 2X
- Two 74G Western Digital Raptor SATA @10,000rpm
- RADEON X800XT PCIE vivo 256MB
- Leadtek TV tuner card Vinfast 2000XP
- Codegen 550W PSU
- Audigy 2 sound card
- Aurogate 2 fan controller
- Liteon CD burner 52x32x52x

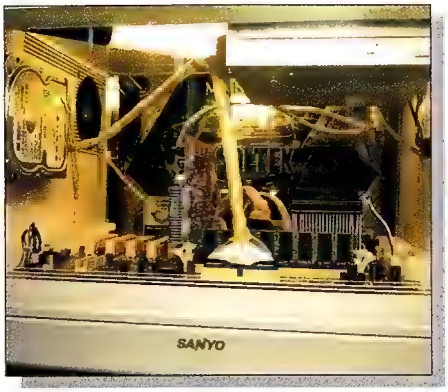
The focus is purely on the internals and as such, I used a clear Perspex case plus three LED silent fans and one LED fan cover for the rear fan. I also used LED cables to achieve the desired effect. For the fan covers. I decided to use Thermaltake gold grills because I figured that these are enough to conceal all five case fans.

The construction of the PC took place at Infinity Computer in Burwood with the help from Peter and Mike who are both experienced computer engineers. The whole project took about two days.

Due to the fact that P4 3.6GHz CPU gets quite hot, I decided to use a water cooler instead of the standard fan. At this stage I have only run one benchmark test and it was the Mad Onion Benchmark 2001, with a pretty good score of 22,900. I am very happy with both the performance and the look of the PC.

Trevor's Microwave Magic





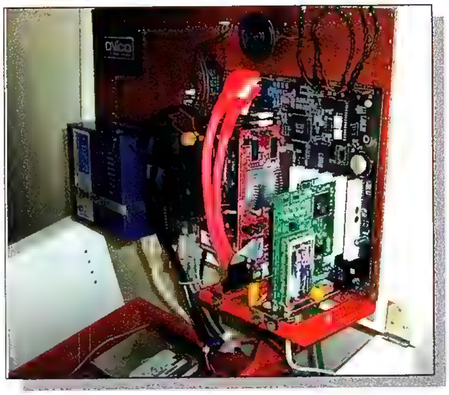
Technical details

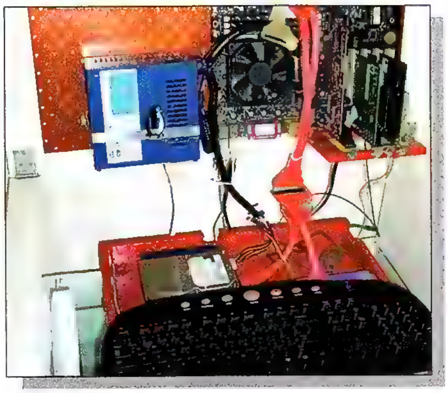
- Sanyo microwave oven EM-V890
- Soltek SL-FRN2 (Gold)
- Athlon XP 2400 (Standard Cooler)
- DDR 400 512MB
- ATI RADEON 9600XT 128MB
- Western Digital 80GB
- LG DVD/CD-Rom combo
- Stealth case fan
- Yellow cold cathode/LED's/oven lamp
- Oven blower fan, lights and LEDs controlled from soft touch front panel

Cheap or free microwave oven boxes have a beautiful Perspex window, they are natural hotboxes if you have room but no cash.

I arranged the mobo to slide out on runners from a TV board for access. Extension/power cabling is channelled through the carousel motor hole and I strapped the ribbon to the HDD and DVD/CD with yellow tape. The back wall has the silver box lid from a previous Soltek purchase with flashing yellow LED's for eyes and helmet. A yellow cold cathode completes the interior. I removed the inside door shield for clearer view. The 400W PSU replaced the HV transformer and I kept the original blower for artic cooling of the whole thing. I fitted a case fan as an extractor on the other side of the box. I tapped the soft touch front panel for starting/reset but kept the clock and timer to run the lights and fans.

Richard's Videobox





Technical details

- AMD Athlon 1.2 Thunderbird @ 900MHz
- Elite KZVZA motherboard
- 512MB PC133 RAM
- GeCube RADEON 9200 SE (fanless)
- DVICO Fusion HDTV card with remote control
- Guillemot Fortissimo sound card with optical out
- 120GB Hitachi Deskstar 7200 RPM
- Ricoh MP7040A, four CD-RW
- Logitech black cordless USB keyboard and mouse

I had a five-year old Toshiba 533MHz laptop playing MP3s into my hi-fi, when the idea to go to Digital TV took hold. I thought a full DTV receive/record computer was the go – but it was well beyond the capability of the Toshiba.

An old Elite motherboard with an Athlon 1.2GHz Thunderbird was screwed to a painted pegboard with alfoil glued to the back. A plywood PCI card bracket and matching wooden box for the HD and CD-RW were sprayed with glossy red auto spray.

My heatsink turned out a bit heavy when fitted as the motherboard hangs upside down when the lid is shut, so the Zalman speed controller fan was used at 1500rpm with the original Athlon heatsink. A few LEDs show the action and a black UV tube lights up the IDE lead.

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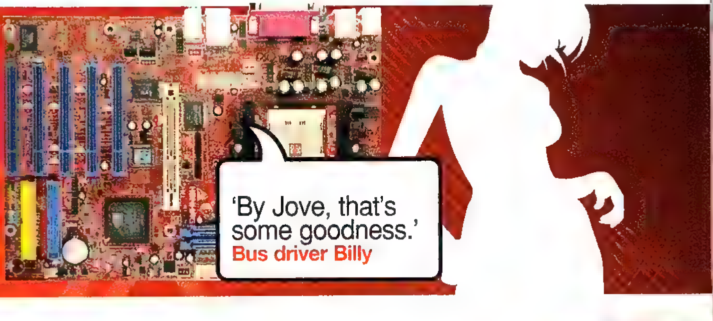

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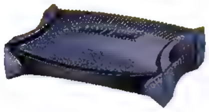

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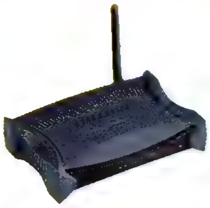

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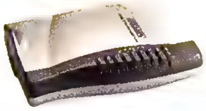

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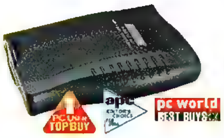

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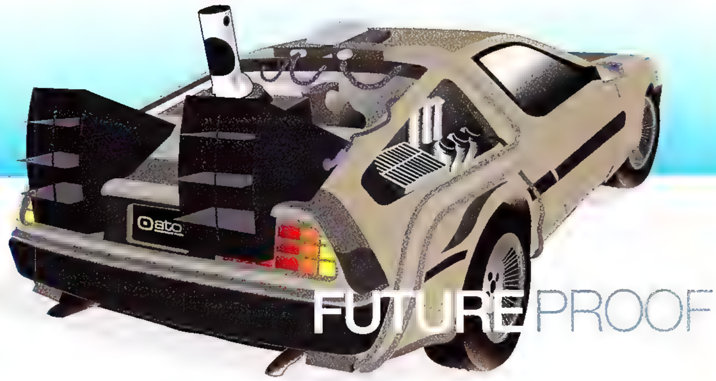


Replicators, engage!

Printers get fun: Logan Booker prototypes the emerging technology of 3D printers.

Printers have come a long way since their humble beginnings in the 1930s, when Chester Carlson invented electrophotography. The process, otherwise known as 'Xerox', continues to live on in photocopiers, fax machines and printers everywhere – although in a somewhat more advanced form.

However, the high-speed progression of modern-day technology demanded that printing take the next logical step – that step being from 2D to 3D. It might be hard to imagine printers creating full, three-dimensional objects using nothing but a model from a CAD program or 3dsmax, but today the technology has made it very much possible.

Obviously, such a technology cannot survive on its novelty value alone, and indeed, the main application of this technology is in manufacturing, where it has proved to be a godsend.

Engineers will normally spend enormous amounts of time, effort and money producing pre-production models of products to work out flaws and design problems. Called prototyping, this step is by far one of the most important in producing a new product, be it a car part, mobile phone or turbine. Using a 3D printer, these engineers can quickly create a fully-realised representation cheaply and quickly. Where such a process would take weeks, it takes days, and can be done for a few hundred dollars, rather than tens of thousands.

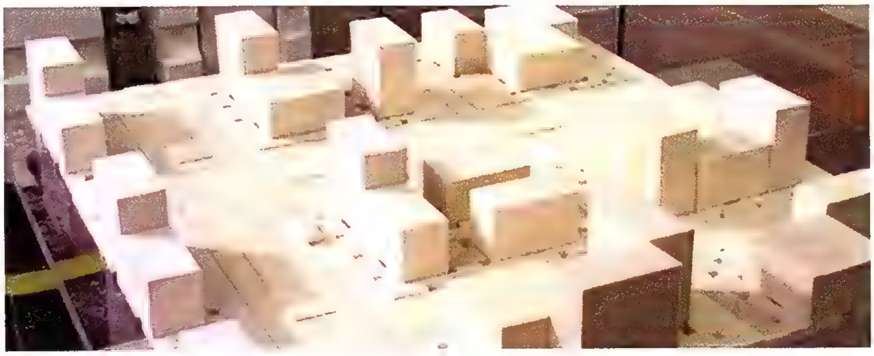
Different companies employ different methods of creating 3D objects with their printers. However, the base method remains the same. Like a standard 2D printer, a 3D printer will 'print' the object in lines, or 'layers', slowly forming the object from a base material – usually a acrylonitrile-butadiene-styrene (ABS) polymer that is easily machined yet tough, or a powder infused with a binding agent. Such materials can also be combined with epoxies that are heat or impact resistant, allowing the 3D 'print-outs' to be used in their actual roles.

For example, Dimension Printers, a 3D printer company in the US, uses ABS plastic to manufacture its models on its BST (Breakaway Support Technology) and SST (Soluble Support Technology) printers. Using the company's own 'Catalyst' software, the 130-odd kilo machines can take a range of models from different programs and produce a real object. The machine plugs into any standard power point and can go on to produce layers as thin as .245 of a millimetre, modelling objects 30cm tall by 20cm wide with a depth of 20cm.

Another US company, Z Corp, uses powder instead of ABS. The advantage of using a powder is that it can be combined with other materials to create stronger or more flexible components. Z Corp offers a choice of starch, plaster and composite powders, with the plaster-based powder providing the small thickness, producing layers as thin as .127 of a millimetre. Models can then be infiltrated with epoxies and resins to enhance properties such as strength, flexibility and even the vibrancy of colours.

Right now, the printers are only capable of producing 'static' models; that is models without electronic components. However, this could change in the future. Last year, a team of researchers at the University of California made numerous breakthroughs in a process that would allow electronic circuitry, including semiconductors, to be manufactured using 3D printers. This would allow devices such as remotes, mobile phones and perhaps entire computer systems to be manufactured with just a printer, saving significant costs in assembling and raw resources.

ABOVE: The humble printer is overhauled with new technological developments – and consequently looks like a kitchen appliance.



ABOVE: Forget black and white Bubble Jet: welcome in the era of 3D printing!

The whole concept of manufacturing objects 'generically' rather than on an assembly line is very similar to the nanotechnology-based future presented in numerous science fiction novels such as Neal Stephenson's *Diamond Age* and reasonably credible non-fiction books such as Eric Drexler's *Engines of Creation*. We're still a long way away from this however, and 'nano-manfacturing' involves the use of waste or base elements to produce objects (carbon to diamond for example), rather than the actual materials and obviously nanobots.

Another disadvantage of 'manufactured' circuits is their sub-standard performance. According to a *New Scientist* article on the technology, 'polymer' based circuit boards are some 100 times slower at switching than conventional silicon based ones, making them almost useless for high-speed electronic components.

Perhaps further research will improve on this, but for now, no working Pentium 4s will be constructed by a 3D printer. The research team believes that robotics will be best served by the technology.

So how much do these printers cost? The cheaper models, which require the user to 'break off' the support structures themselves start at around US$24,000, while ones that produce models with soluble support structures will set you back US$34,000. But then who said new technology was cheap?

NVIDIA jumps the PCI Express

John Gillooly takes a look at NVIDIA's upcoming nForce4 SLI-enabling chipset.

For several months now the PC industry has been in a state of confused migration towards PCI Express. So far only Intel has released chipsets supporting the new peripheral interconnect standard, however industry impetus is irrevocably heading towards a PCI Express future.

This will certainly take some time and it will be slow and painful to watch. Thankfully PCI Express support is coming now for the Athlon 64 in the form of VIA's KT890 chipset and the competing NVIDIA nForce4.

When NVIDIA got into the chipset market several years ago it first tested the waters with the decent, feature packed nForce chipset for the Athlon. It then took the lessons and applied them to create the nForce 2, which was an amazing success due to a combination of good design, great features and VIA's chipset plans being damaged by AMD's constant delays of the Athlon 64.

The third generation of nForce chipset was launched to support the Opteron and lacked much loved features like the Soundstorm audio of the nForce2. Over recent times NVIDIA has gradually improved nForce3 by fixing SATA support, adding Gigabit Ethernet and its own hardware firewall technology.

nForce4 builds upon that technology and also adds PCI Express support. It supports NVIDIA's 'Active Armour' firewall, 3Gb/s SATA 2.0 (even though at 150Gb/s most drives will struggle to max out the bandwidth on first generation SATA), improved support for its nTune tweaking software and finally, support for dual graphics cards.

The chipset comes in three flavours. The low end nForce4 which supports the Athlon 64 and Sempron CPUs, high end nForce4 Ultra for the Athlon 64 and FX processors and the very special nForce4 SLI, which features two PCI Express graphics slots.

nForce4 SLI is an interesting piece of hardware. While PCI-E graphics usually run over a 16 lane connection, nForce4 SLI features two connectors that can use eight lanes each for dual card support. If you are running a single card then the connection is x16, but as soon as you add a second card and reverse the special SLI PCB the chipset will switch over to this x8 configuration. NVIDIA points out that this does not impact performance.

Obviously this will most likely be the best motherboard chipset for those who see dual GeForces in their future, even though VIA will release an SLI-capable chipset as well.

One thing that had been hotly rumoured was that the nForce4 would sport revamped SoundStorm audio, however NVIDIA has confirmed to us that this will not be the case. nForce4 will feature the same rudimentary AC' 97 codec support that the nForce3 did.

Once PCI Express chipsets emerge for the Athlon 64 we should see consolidation around this future interconnect standard. All that remains is for ATI to reveal the PCI Express chipsets it has planned for AMD and Intel platforms.

ShortCircuits

Russia has decided that the only way it can find out how stressful a trip to Mars would be is to simulate it. Called the '500 Days' experiment, six volunteer cosmonauts will find themselves shut away inside a pretend shuttle, along with a doctor and a few tons of food and water. Apparently, Russia has invited the US to participate in the endeavour. While it appears to have declined the offer, NASA is 'interested' in whatever results the experiment will uncover.

It seems Star Trek technology is the way of the future. As redundant as the statement may sound, it really is the truth, with a company called 3Dsolar (www.3dsolar.com) advertising a '3D' projector capable of rendering objects produced in CAD software as real images. According to the company's website, these objects can be manipulated; the website using the example of using such a projector in a storefront, tempting passers-by with 'virtual' products. We're trying to ignore the fact that the website looks like it was designed by a multimedia student.

According to sources, there's currently a shortage of GDDR3 memory chips. What this means is that high end graphics cards won't be in plentiful supply until production picks up. Until then, don't be surprised if the availability of the video hardware is, well, less than available.

It now seems set that Bill Gates will show off his Xbox successor at next January's Consumer Electronics Show in Las Vegas. Gates is the opening keynote speaker at the event where he unveiled the design of the Xbox in 2001. This comes as rumours have started that ATI has moved engineers from its Xbox 2 VPU team to others indicating the graphics chip for the console has taped out.

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A tale of two turns

Logan Booker tackles the ultimate argument facing gaming today. Is realtime better than turn-based?

There are some battles in the world that are never-ending – mainly because they consist of two sides empowered with steadfast, unwavering opinions, as most battles are wont to have. Usually, a battle with only one side is not much of a battle, unless of course it's a fight inside one's mind. In which case it's still a battle of two sides, your sane side and your crazy side – but no one in reality gives a damn about these sorts of battles. That is until the crazy side decides to hijack your body to plant soap-based explosives in the basement of every major financial building in the city. *That's* when people start to take notice.

Gaming is no exception, and it has its own share of internal strife. Oh yes. It has a community fraught with civil wars, wars that will never be won because they are based on opinions. Is Doom 3 better than Half-Life 2? Are inverted mouse users modern-day freaks? Would Gandalf kick Saruman's arse in a fair fight? Obviously, there can be no definitive answers to these questions. There is one argument though that, through logic, can be won, and that is the ongoing battle between turn-based and realtime.

In all seriousness though, it's more a sad, coming-of-age story, a journey from one generation to the next, rather than a battle. Imagine turn-based gaming as the caring grandfather of modern gaming, and realtime as the upstart kid the grandparent must care for – a kid fixated on ramming things with his head and jumping through walls à la Vivian from *The Young Ones*.

Ancient history

In order to answer this troubling conundrum, we must examine the history of games. That means all games, not just the electronic variety.

Gaming has been around since the birth of the universe and, more than likely, before even then, depending on your religion. If you're not particularly religious, well heck, feel free to believe whatever you want to believe, be it cosmic forces playing pool with planets, the way of the Jedi Force or even dinosaurs enjoying a quiet game of 'What's that smell?', which wouldn't be very quiet at all, even if it existed. We'll leave that one up to you.

Hey, if scientists can make up stuff, what's to stop us from speculating?

Of course, modern games can be traced back pretty far. No one knows for sure when the first game was created and what game it was, but we can fall back on the old crutch of 'earliest known' that has saved many a university professor.

According to numerous sources, the earliest known game was called The Royal Game of Ur and originated in the far-flung land of Mesopotamia. Apparently it was much like backgammon, except with dice.

On the other hand, English history speculates that Three Men's Morris is the oldest game, with playing boards found in Egypt that date as far back as 1440BC.

Other sources say the African Stone Game or Oware is in actual fact the earliest known game. Oddly enough, many mobile phones carry a version of this game, where it's known as Bantumi.

Bantumi involves 14 pots – six smaller pots and one big pot for each player – containing four counters in each of the smaller pots. Players take turns to remove counters from one of the smaller pots and distribute them anti-clockwise, placing one counter in each pot. The player with the most counters in their big pot wins.

Bantumi is a good example of turn-based gaming, and introduces a number of flaws encountered with the format. For one, a smart Bantumi player can never lose against an electronic opponent, as it will always take the same action if presented with identical data – a flaw in any 'black box' system. Secondly, as long as one player doesn't take their turn, the game can never reach a conclusion. Finally, and probably the most significant flaw, is that all turn-based games favour the player who takes the first turn, barring any intentional balancing.

A turn too far

Some of these points can be easily refuted. For starters, it's unlikely ancient Egyptians or Mesopotamians had a Commodore 64 handy to pit their skills against and stallers would have met an untimely death via spear or freak embalming accident. However, the last point poses some trouble.

The problem of the 'first turn advantage' is one that has plagued game designers for years. Collectable card games such as Magic: The Gathering and Legend of the Five Rings battle each and every expansion to fix this balance problem. Luckily, the significance of such an advantage is minimised by the fact that it's incredibly easy to squander.

It's important not to get too focused on these issues. For starters, the perceived problems with turn-based gaming are more related to time than technicalities. By their very nature, turn-based games are slower and more involving than their realtime counterparts.

Perhaps the best examples of turn-based gaming at its peak are Julian Gollop's X-Com series, Sirtech's Jagged Alliance and Interplay's Fallout. Every one of these games was critically acclaimed, thoroughly enjoyable and turn-based.

Well, almost turn-based.

Certain components of these games occurred in realtime. For example, the research and development sections of X-Com were realtime and the role playing element of Fallout was entirely realtime. These are sections that would have been inconceivably boring in a turn-based format and in the case of Fallout, it was the RPG sections that made up the meat of the game, not the turn-based combat.

So, in reality, these games were hybrid turn-based/ realtime, even if we didn't notice it at the time. What upsets the balance of these elements is the overuse of either one. For instance, Fallout: Tactics featured realtime combat yet was generally considered inferior to its predecessors because of it.

Another interesting point is that these games – with the exception of Tactics – were single player, so a hybrid gameplay model was acceptable; the only person who would get upset because it took 10 minutes for you to decide which punk deserved the last remaining shell in your Pancor Jackhammer more, would be the punk who deserved it.

ABOVE: Fallout mixed realtime and turn-based gameplay.

RIGHT: Silent Storm is a turn-based combat game similar to Fallout .

Ironically, the turn-based model, which at one time was exceptional for handling multiple players, has proven to be inferior in the face of realtime.

The waiting game

Anyone who has played a multiplayer game of Civilization knows that without hardcore dedication to the cause of world domination, you'll only get to the 50th turn before boredom sets in. Turn-based multiplayer games take an eternity to play out, and the Holy Grail for many game designers, such as Sid Meier and Peter Molyneux, is a fast, turn-based game. If only it weren't an oxymoron.

Only a few games have succeeded at perfecting this balance, and those games tend to be simple in design.

For instance, an amateur game of checkers or chess can be played in an hour or two, but it's unlikely you'll want to play more than one or two games. Alternatively, complex turn-based games get overwhelming quickly, and it only takes one player to lose heart and the game falls apart. Most people would prefer to play a simple, complete game that has a result, rather than a slow complex game with no result. Turn-based games also have another flaw – you usually don't have to complete a game to know who the winner is and it's hard to imagine a game of multiplayer Civilization coming down to the line – one player sets up an economical or military advantage, and from then on in, it's just a waiting game. Many games, including Civilization, combat this by providing multiple victory conditions. But it's far from a perfect solution.

A realtime game, on the other hand, forces the player to play quickly and intelligently. Although there's a higher chance for error, realtime is more realistic, and therefore plays to a natural strength – we live in a realtime world, not a turn-based one. Humans instinctively work on reflex and routine.

A side effect is that a realtime game must be less complex than a turn-based one, or else you'll overwhelm the player. No one likes memorising a bunch of control keys, and, out of habit, human players will eliminate the least important controls. For example, although it may be useful in rare circumstances to throw a grenade, shooting is for the most part much more effective and many players will simply ignore throwing grenades. In this case, not only is a key eliminated, so is an entire game mechanic.

Therefore, it's important a realtime game is designed with a streamlined, easy-to-use interface – if only to guarantee that the hard work of the developer doesn't go to waste.

End of an era

Turn-based gaming lost its legs when online gaming became accessible. Today, people get physically sick at the concept of 'play by email', when it's considerably easier to get into a fast-paced action game such as Quake or Warcraft. The idea of booting up a turn-based title is very unappealing and seems almost an insult to those with LANs at home or broadband connections.

Technology has played a major role in nurturing realtime from its beginnings in titles like Pong – an at-the-time revolutionary multiplayer *realtime* game – and the PCs of today have the power and communicative capability to provide gamers with the now preferred taste of realtime gaming.

Take Counter-Strike, and before that, TeamFortress. These titles instantly drew enormous amounts of interest for the simple and instantly-gratifying experience they provided the player.

For now, realtime rules the roost. There's no 'first-player advantage', effects of player choices are instantaneous, and the focus is more on reflex rather than skill, which naturally appeals to our sense of survival – even though it's being sparked by a digital experience. Turn-based will always have its place, but it's unlikely it will ever be as dominate as it once was.

Which side of the fence are you? Speak your mind and let us know at *www.atomicmpc.com.au/forums.asp*

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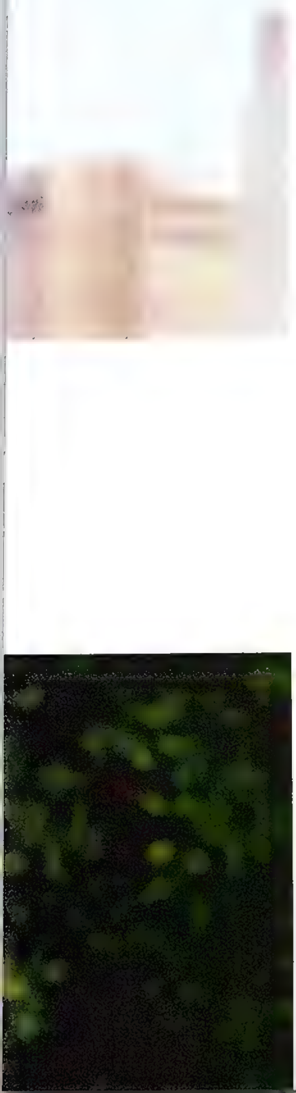
a question of qubits

Like truth, the quantum world appears stranger than any fiction from the minds of men. Yet this bizarre universe and the computing power it promises is set to shape the future of our race. Darren Ellis tackles the cutting edge of the world's most important computing development.



The sun beats down on your head as you and your peasant guide, Ackbar, leave the sure-footed camels behind and make your way into the rock-filled valleys of the Afghanistan Hindukush mountain range. You pause to take a swig of water and wipe the sweat from your brow before following admiral Ackbar up the scree, where he stops ahead of you at the entrance of a dark cave long enough for you to catch up before disappearing inside. Praying that the information he'd given you was correct, you plunge into the darkness.

After many twists and turns the tunnel opens out into a large, flat room. A thick layer of dust blankets the floor, save for Ackbar's footprints. As instructed, he's set up an old diesel generator for you near a rickety trestle table in the centre of the room and on it sit two old generation dust-covered PCs.

As the generator roars to life, the room floods with noise and light. The standby LEDs flicker to life on the attached LCD monitors – a bulky, inefficient, display technology – and you lean forward hoping that the machines have withstood the 30 years or more of laying dormant in this dusty grave.

They power up the first time, 3GHz dinosaurs in all their glory, and you have to call on your ancient history of Windows to get them to work.

Damn. The data you need is easy enough to find, but it's encrypted with 4096-bit triple-DES encryption, at least four times the impenetrability of the US military's standard for that time.

You root around in your backpack for the handheld computer you bought at the flea market in St Petersburg, plug a universal connector lead into it, and then slide it into the old machine. You load the 'Key-disbander' program you need on your handheld, and press the 'Go' button.

Instantaneously, before you've even lifted your finger off the button, the code comes through. What would have taken that beast machine of your childhood - that 64-bit AMD relic - a million years to crack has come undone in the moment of a key press by a cheap Russian knock-off quantum computer.

And now you've got all of Osama Bin Laden's details. It's all there, in front of you. The emails he sent and the plans he'd made all those years ago, but most importantly, where he stashed the bullion.

You pat the handheld. It was the best five dollars you've ever spent.

The Quantum Age

It's a fanciful scenario, but for the most outlandish aspects of the story - its setting and the content of the PCs – the rest could be fact.

Quantum computers are nearly here, and they're like nothing you've ever conceived. When the very first quantum computer is commercially released, it is going to kick the butt of every computer that has ever come before it.

Even a basic quantum computer will be able to do tasks that today seem impossible. Long term weather prediction? Can do. Search trillions of entries in a database and spit out a result instantly? Can do. And forget about your Seti@Home or the Folding Project. One of these bad boys will crunch that data faster than the entire network of globally distributed PCs all put together.

The day the first commercial quantum computer arrives will be the dawn of a new age of computing.

But what exactly is a quantum computer, and how can you get a hold of one of these miraculous machines? To answer this we need to take a look at the fundamental precepts behind the operation of all computers, and from this distil years of research into quantum computing into a nicely digestible geek-friendly form.

Simultaneous states

First, lets blow your mind.

As you know, everything in computing depends upon the binary states of 0 and 1, and at its most basic level your CPU is a conglomeration of transistors that represent on or off (the 1s and 0s we know as binary digits - bits). With a few bits you can perform rudimentary mathematical operations, such as multiplication, addition, subtraction and division. With more bits you can add Boolean operations which gives you AND, OR and NOT logic. This is the basis upon which all computing is built.

Now imagine you wanted to solve the simple problem of discovering every possible permutation of an 8-bit number, which at 2^8 happens to be 256 different combinations ranging from 00000000 through to 11111111.

Assume for arguments sake you have a classic computer and quantum computer side by side, and each performs one calculation a second. It would take the classic computer 256 seconds to run through all possibilities. It would take the quantum computer just one second.

Now we up the ante: let's do the same for a 64-bit number, which has 1.8×10^{19} possible combinations. Yeah, a *lot*. And lets assume again that we have a classic computer and quantum computer side by side each performing one calculation a second.

It would take the classic computer 584 trillion years to find all the possible permutations of a 64-bit number. It would take the quantum computer... *just one second.*

timeline of quantum computing

1973 – A paper is published by Alexander Holevo showing that *n* qubits cannot carry any more information than *n* bits.

1976 – It is discovered that Shannon information theory cannot be generalised to fit the quantum instance, but that it is possible to construct a quantum theory that is essentially a generalisation of Shannon's theory.

1981 – Richard Feynman is the first person to suggest using quantum mechanics to perform computations. He said simulations of quantum systems that would take classical computers months or years could be achieved with even a simple quantum computer.

1985 – The first universal quantum computer is described: it's a quantum computer capable of simulating any other quantum computer. This significantly raised the potential of a simple computer performing a number of different quantum functions.

1993 – Dan Simon from the Universite de Montreal creates an oracle problem that a quantum computer will be exponentially faster than a classical computer in solving.

1994 – Peter Shor develops what is called Shor's Algorithm. It allows quantum computers to perform complex factorisation tasks on large integers quickly. This is adopted as the default test for a quantum computer, and gives rise to a quantum computer's code-breaking capabilities.

1995 – A scheme for quantum error correction is proposed by Shor, theoretically allowing for working large scale quantum computers.

1996 – An algorithm allowing for a quadratic speed-up in random brute-force database searching by quantum computers is invented by Lov Grover at Bell Labs.

Now you're getting an idea of the incredible potential of quantum computers.

But how is this so? Unlike the computers of today as we know them that need to process one combination after another sequentially, a quantum computer can process all combinations at once.

We'll delve into how and why in much more detail further on, but in summary the basic building block of a quantum computer is the quantum bit, or *qubit*. The funny thing about qubits is that unlike their binary counterparts, a qubit is both 0 and 1, *simultaneously.*

Naturally, this does not make sense. How can something be both on and off at once? But in the quantum world not only is this possible, it's also the natural order of things.

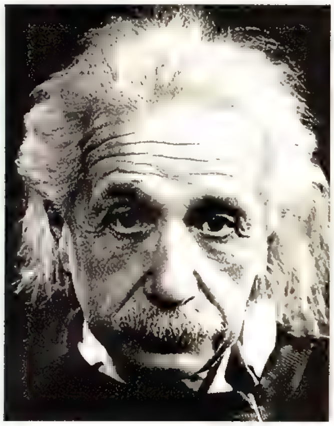
Furthermore, there's a second quantum peculiarity involved, that of *entanglement*. This is where two particles – even when separated over vast distances – can be described with respect to each other such that a change affecting one particle is almost immediately reflected in the other. Einstein went so far as to call it 'spooky action at a distance', but could not explain it.

Richard Feynman, arguably the greatest physicist of the modern age and the man who first conceived of using quantum qualities as devices for quantum computation once prefaced a lecture on quantum mechanics with the following:

'I think I can safely say that nobody understands quantum mechanics... So do not take the lecture too seriously...but just relax and enjoy it. I am going to tell you what nature behaves like. If you will simply admit to yourself that maybe she does behave like this, you will find her a delightful, entrancing thing. Do not keep saying to yourself, if you can possibly avoid it, 'But how can it be like that?' because you will go down the drain into a blind alley from which nobody has yet escaped. *Nobody knows how it can be like that.*'

So far we haven't discovered how a particle can exist in many states simultaneously, nor can we explain entanglement even though we can create and harness it. This hasn't stopped mankind from being able to use these peculiarities and put them to unique and novel uses. Quantum computing is just one such use and is by far the most promising of all.

We're getting ahead of ourselves though. To understand how a qubit (usually represented by *spin* - an intrinsic property that exists in particles) can exist in all positions at once - a state called *superposition* - we need to take a step back into the confusing history and machinations of quantum mechanics.



ABOVE: Albert Einstein galvanised the world with his theories of relativity, showing that space and time were linked. Einstein did not like the implications of quantum mechanics though, as it implied that something was wrong not only with his own theories, but the world was not nearly as simple as it had seemed.

Classical mechanics

Until Sir Isaac Newton published *Philosophiae Naturalis Principa Mathematica* in 1687, no one knew what the force was that made apples fall from trees directly onto the ground (or as rumour persists onto Newton's own head), instead of apples flying off at angles.

Newton's masterstroke in the *Principa* was his Law of Universal Gravitation, proving that the force he called gravity that made the apples fall to the ground was the exact same force that kept the planets revolving around the sun, and the moon around Earth. Newton even included simple formulae that could be used to calculate orbits of planets *and* the fall of stones. These formulae are amazingly accurate, and with slight modifications are still used to describe the world today.

Even though Newton had pinpointed gravity in a remarkable way and revolutionised physics, it wasn't for a further 228 years until anyone even knew what gravity itself actually *was*.

Albert Einstein had published his *Special Theory of Relativity* in 1905, in which he explained his ideas on how nothing could travel faster than light. He also showed that that light was not just an electromagnetic wave but could also be described as packets of particle-like quanta (called photons).

The theory was met with wide acclaim, but something troubled Einstein. According to Newtonian physics gravity was instantaneous, but Special Relativity had proven that this could not be. If the sun inexplicably blinked out of existence, according to Newton's calculations we'd feel the loss immediately even though the last of the sunlight would still be making its eight minute trek across space to us. This obviously did not gel with Einstein's calculations that had shown that nothing could travel faster than light.

> The more success the quantum theory has, the sillier it looks. ... I think that a 'particle' must have a separate reality independent of the measurements. That is an electron has spin, location and so forth even when it is not being measured. I like to think that the moon is there even if I am not looking at it. ... God does not play dice with the cosmos.

It took Einstein a painstaking 10 years to formulate his thoughts on this, and in 1915 he published his *General Theory of Relativity*, in which he'd not only tackled gravity, but had thrown all notions of Newtonian space and time on its head.

Einstein's theory showed that space and time were linked (*spacetime*), and that gravity is merely the warping of spacetime caused by the presence of matter. It was an audacious theory, but was borne out by many complex tests. A new era of classical physics was born; they were still based on Newtonian physics, but modified to include relativity.

Right about now you might be wondering what exactly all of this has to do with quantum mechanics and really *really* fast computers, and you'll see in a moment.

Classical physics is what you were taught at school and it forms the basis of our understanding of the universe. Classical physics is, put simply, the study of the large. It's great at telling you the orbits of the planets, how quickly a car will stop when the brakes are applied or how far you can throw a GeForce 2 in FrisbeeMark, but once you start applying these rules and laws to the realm of the sub-atomic it all comes apart, literally, at the seams.

Classical physics cannot describe superpositioning nor entanglement, nor many other aspects of the quantum world.

Einstein did not like this at all, but even he gradually grew to accept it. He died in 1955 still trying to come up with the one *Theory of Everything* that would unite quantum and classical mechanics. To this day no one has been able to do this, although string theory currently comes the closest.

A cat neither here nor there

So back to the topic of super powerful machines – as discussed the facets of the quantum world that can give us more computing power than we can ever possibly imagine are superposition and entanglement, but exactly how do they give us quantum computers?

Superposition is the way that a particle or quantum entity can exist in a flux of all of its possible states simultaneously. This lasts until the entity is observed or measured in which case it shows as only being in the one state. In other words the moment you look at it, it stops.

Superposition was explained most succinctly with the most famous feline of all, Erwin Schrödinger's cat.

Schrödinger posited the following thought experiment: you have a sealed box, and in this box is a radioactive nucleus, a Geiger counter connected to a cylinder of poison gas, and an unfortunate house cat. The Geiger counter is set to release the poison gas when it detects the decay of the radioactive nucleus.

However the radioactive nucleus is in a precise 50-50 quantum superposition of states of being half-decayed and half not-decayed. Until the intelligent observer (the Geiger counter) measures the nucleus and forces the quantum system to adhere to a unique state (decayed or not decayed) the actual nucleus itself remains constant in superposition.

The superposition reaches much further than that though. Until such time as the Geiger counter measures the nucleus then the poison gas and the cat are also in superposition of states of being released/not-released, alive/dead. Until you open the box, you'll never know whether the cat is alive or dead, and therefore it can be said the cat is in a superposition of states of being both alive *and* dead. Phew, sucks to be the cat.

When we refer to superposition of qubits for the purpose of quantum computing, we're usually referring to a particle's state of spin – although there's no real parallel to the quantum world, think of an orb's rotation in classical physics. All we need to know with spin states for quantum computation is that particles can be found in two general forms – spin up, or spin down (and hey presto, there's our basic 0/1 building block of computing). However, thanks to superposition, there are also infinite combinations of degree of spin between the two states.

It's this spin and superposition of states that makes quantum particles perfect for binary applications but with mind-blowingly massive parallelism. Since our computers operate based on whether a bit is 0 or 1, and this forms the building block of all instructions, then a qubit that is both 0 or 1 at once can be used as the building block of a computer that can perform every possible combination of instructions at once. And you think you've got fast FPS in your games *now*.

Now you see it, now you don't

Unfortunately, this power isn't all that simple to harness. There is a major hurdle with using superposition as the basis for quantum computation. When you observe the quantum state to see if it's spin up or down, whether it's a

1997 – The first paper proposing bulk spin resonance (thermal ensembles) is published. This shows that a cup with trillions of computers each consisting of a single molecule with qubits in the spin-states of its protons and neutrons has enormous redundancy, allowing it to maintain coherence.

1998 – Demonstration of the first working two qubit nuclear magnetic resonance (NMR) computer at University of California, Berkeley.

1999 – Demonstration of the first working three qubit NMR computer at IBM's Almaden Research Center.

2000 – Demonstration of the first working five qubit NMR computer at IBM's Almaden Research Center. It is able to execute part of Shor's Algorithm.

2001 – Demonstration of the first working seven qubit NMR computer at IBM's Almaden Research Center. Successful execution of Shor's Algorithm on the number 15.

0 or a 1, you 'decohere' all the possible outcomes into one final, tangible outcome. Decoherence is the process of eliminating all of the possible quantum realities into the one final true reality.

So when you measure the state of a particle to be spin up, it will thereafter *always* be spin up, and vice-versa. Measuring causes you to lose the superposition, which is rather a problem, as a massively parallel one-shot computer isn't all that useful.

The trick with quantum computing is to be able to read the state of the qubit without influencing it, but as experiments like Young's double-slit have shown (see 'The double-slit experiment' box), the quantum world is amazingly canny at detecting observation.

But there is a solution – it's possible to nudge a qubit toward one or another state without actually collapsing it into a result, but this merely increases the probability that the qubit will have a certain spin state.

Which leads us to a further challenge in superpositioning quantum computers – strap on your thinking caps here – by nudging the states all you're doing is decohering only those states that are probabilistically wrong, and leaving those that are more probabilistically correct.

Note that's not the same as being correct, only more *likely* to be correct.

And this is the crux of superpositioning quantum computers: how do you derive answers from a massively parallel yet entirely probabilistic machine?

This would make a fantastic background to a sci-fi story if it wasn't fact. The answer is in probability distribution, a matrix of values assigned to the probabilities of different outcomes. In simple terms, this means that outcome A is 10 times more likely to be correct than outcome B, and so on.

Luckily for us mere mortals, a superpositioning quantum computer is naturally skewed in favour of the correct answer. One method of optimising this is to use a system we're all familiar with – error correction. However to build error correction into a quantum machine requires the use of more qubits, and at the current stage of development leading researchers are having a hard enough time trying to get any more than just few qubits playing nicely together.

And this leads us to the second key trait of quantum computing: entanglement.

ABOVE: Dr Chuang and the test tube in which his researchers at IBM's Almaden Research Center coaxed a seven qubit computer to life. This computer performed the first run of Shor's Algorithim, proving that massive quantum parralelism works.

Entanglement

If you think superposition is an odd concept, entanglement is incredibly bizarre.

Entanglement is used to describe the way two or more quantum entities can become inextricably linked together, such that one particle affects the other.

This doesn't sound so strange except for the fact that whatever happens to one particle is reflected in the other, simultaneously, whether they are side by side or across the other side of the globe.

In a simplified version, if you've got two entangled photons that are both in a superposition of spin up and spin down states, and you want to find out which way one is spinning, then measuring photon A and getting a result of spin up will *immediately* reveal photon B to be spin down.

Experiments confirming entanglement have been conducted, but the most startling confirmation came from an experiment conducted by Professor Nicholas Gisin of the

Department of Physics, Geneva University which involved fibre optic technology.

Using a set up of fibre optic cables with a total fibre optic path of 16 kilometres, Gisin was able to prove that entanglement works over such a large distance. The photon states were transmitted simultaneously from one photon to the other, with the information travelling at *10 million times the speed of sound.*

Just consider this a moment – if we use qubits as we use bits, to represent information, then it may be possible to use qubits to communicate like we do with the phone or Net or anything else – except the communication is instant and distance agnostic. Can you say *Star Trek* communicator?

Or even more impressively – truly secure, unbreakable, quantum cryptography.

But back to the world of computers – how can this 'spooky action at a distance' of entanglement be efficiently harnsessed in quantum computation?

With entangled entities you can study the spin-states and the interactions between them without actually interfering with the qubits at all, neatly side-stepping decoherence. By comparing spin states, you can tell if there have been any changes between them without interfering or actually learning the information held in the qubits itself. In other words, the problem of the mega-brain parallel one-shot quantum computer can be solved. You get to use it more than once now!

Unscaleable

So this is all well and good – the staggeringly powerful promise of quantum computing is real, but there is just one problem: how do you build one?

Although fully working basic quantum computers have been created in laboratory settings, most of the research into building quantum computers has gone into the many devils that reside in the details.

Intel and AMD are currently creating 90 nanometer processors (.09 micron in the old money), and are investigating smaller chips. This is amazingly small. A typical bacterium is between one and 10 microns. It's like using Uluru to compute when you should be using motes of dust.

There are a million microns to a metre, and a thousand nanometres to a micron. This is the size scale that current CPUs are constructed at. Quantum effects occur at or below a measurement called the Planck length, which is where classical physics cease to hold sway and quantum physics take over. To put this into perspective:

There are 1,000,000 microns to a metre (or 10^6 per metre)

There are 1,000 microns to a nanometre (or 10^9 per metre)

There are 1,000,000,000,000,000,000,000,000,000 Planck lengths to a nanometre (or 10^{35} per metre).

Currently there are no measurements smaller than the Planck length as the distance is so small already that no smaller size actually physically exists.

Fortunately although the effects of the quantum world operate at this level, it's possible to observe them on a much larger scale. And by this we mean that astoundingly powerful quantum computers can be constructed very small.

At this stage most research has gone into building quantum computers totalling no more than a few qubits.

IBM's Almaden Research Center is at the forefront, and most recently made a seven qubit computer, two qubits larger than their previous record of a five qubit computer in 2000.

This was constructed from billions of newly created molecules with each molecule constructed from seven nuclei – five fluorine and two carbon – giving each molecule seven unique spin-states to provide, when it is taken as a whole, the overall functionality of a seven qubit computer.

This is the minimum number of qubits needed to run the simplest version of Shor's Algorithm.

Shor's Algorithm is a simplified way of working out the factors of a number – not just primes – but it makes for a great proof-of-concept and is ultimate litmus test for any potentially viable quantum computer. The seven qubit computer succeeded.

ABOVE: Physicist Richard Feynman was the first to recognise the awesome processing power of the quantum world.

It may not sound like much, but remember not to relate bits to qubits – according to John Watrous, a computer scientist at the University of Calgary, seven qubits is at least as powerful as a laptop today. And this is at the scale of molecules.

Seth Lloyd, Professor of Mechanical Engineering at MIT, has postulated that a single grain of salt can have around 10^{17} possible qubits in it, meaning 'a grain of salt has all the computational powers of all the computers in the world.'

Think on that a moment, and keep it mind next time you add salt to your chips.

The research at IBM's Almaden Research Center is a lab-only example however, and required nuclear magnetic resonance (NMR) and radio pulses to keep it in tune. But it is at least a milestone, as it not only proves that quantum computation can work, but that it's also accurate. Isaac Chung, project leader summed it up nicely, 'Now we have the challenge of turning quantum computation into an engineering reality.'

Interestingly, however, researchers at Yale University were recently able to demonstrate a 'qubit-on-a-chip'. Using what they call QED (quantum electrodynamics) circuits, the researchers were able to store oscillating microwave photons on chips by holding them in a 'Cooper box'.

A Cooper box is a small superconducting island electrode weakly coupled to a bulk superconductor, but by shrinking the size of the box it became possible to hold the photon there, and use that photon as a qubit.

By creating many Cooper boxes you can increase the number of possible qubits. What's more, this can be done by using today's silicon chip fabrication techniques. The researchers are now working on creating adjacent QEDs so that the qubits can form quantum gates. Unfortunately though, as exciting as this is, Yale's qubits are still the stuff of laboratories. To get the qubits to work you need to cool the superconducting material to two-hundredths of a degree above absolute zero.

Where it's going to take us

By their nature quantum computers are parallelism on a vast scale, and as such when the first feasible quantum computers hit the scene we will find them lurking in applications where parallel computing is needed.

Before this however, and funnily enough, the first use of quantum computers will be to emulate, well, quantum computers. Our bit-based machines of today are not entirely adequate to the task of processing the simulations required to understand quantum computing, but quantum computers most certainly are.

And this lends to one of the most important outcomes of quantum computing – being able to solve problems that, today, are simply impossible.

Drugs can be simulated at the quantum level to test their effectiveness against things like cell membranes, physicists will be able to more accurately simulate and forecast how proteins fold, and the complex interactions between chemicals can be fully simulated and mapped out.

Today the world's most powerful supercomputer is capable of accurately predicting the weather only a few days in advance. A quantum computer could predict it months, even years, in advance without even breaking a sweat. And it could probably fit in a car.

Then there's the impact it will have on us as individuals and a society with respect to privacy – quantum computing will tear down the boundaries of encryption. Every encrypted message, every encrypted transaction, anything at all encrypted in fact will be open like the page of a book.

That said, it will also be possible to create communication devices – perhaps not unlike a PDA or a mobile phone – that contain quantum computers to create completely secure transmissions.

Ultimately the advances of quantum computing will lead us to a greater understanding of mathematics, physics, chemistry and eventually the universe.

But bugger that, what about our PCs? When are we going to be able to play Half Life 2 at a million frames per second and have the latest Linux kernel compiled before your finger leaves the Enter key?

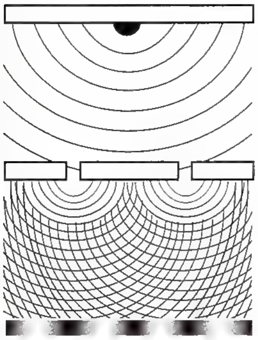
Despite the rapid progress, the first viable and commercial quantum computer isn't likely to be available for another 20 years, and you can expect that only governments and the military will have the budget to afford one.

Even so, when they do hit mainstream, it might not be as you expect. Professor Howard Wiseman from Griffith University in Queensland and member of the Centre for Quantum Computer Technology notes they probably won't replace classical computers, at least initially, but rather 'You'll probably have a classical PC with a quantum co-processor in it,' he says.

And wouldn't that be truly *Atomic*.

The double-slit experiment

One of the more puzzling experiments in proving quantum peculiarities is Thomas Young's double-slit experiment from 1802, which he originally used to prove the wave-like nature of light. In Young's experiment, light is shone through a hole in a board, which falls onto a second board. This second board has two identical slits in it and beyond that is a light-sensitive receptor plate. As the light passes through the two slits, it spreads out onto the receptor behind leaving a pattern that builds up as more light passes through.



As light acts like a wave, light passing through both holes interferes with each other, causing bands of light and dark on the receptor.

This result is calculable in as the light waves act in similar ways to waves in water, and how they add or subtract from each other to cause peaks and troughs. Light bands are peaks, the shadowed bands are troughs.

However if you happen to let light through the hole in the first board one particle of light (photon) at a time, and if you let enough photons through to build up a pattern, you'll find these single-line photons still produce a wave pattern of light and dark bands on the receptor.

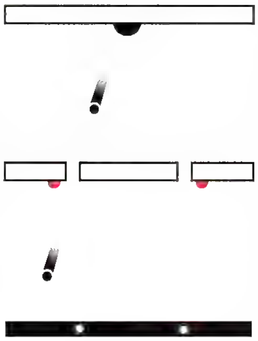
The only way that this is possible is if each photon passes through both slits at once, and somehow interferes with itself before actually hitting the receptor.

Say you modify Young's experiment further and set up a device that measures each slit to see which one the photon passes through, then the photons will only ever pass through one slit or the other, but never both. On the receptor plate though you'll be left with two fuzzy slits as you might expect from photons acting like particles and shooting through in random but straight lines. Once you measure a photon's path, it stops behaving like a wave and instead behaves like a particle.

So what the double-slit experiment shows is that if you let the photon 'choose' which slit to go through but do not observe it happening, then you'll end up with a banded wave pattern from the particles acting like waves. Observe the process in a way that does not touch or interfere with the photon and you somehow change it so that it goes on to act like a particle.

As is common in the quantum world, things get much, much stranger than this.

If you place a single detector between the two slits, but on the receptor side that it can detect the photon after it has passed through the slits, then the photons still act like particles and not like waves. Why is this important? It means that observing the photon after it passes through the slits, impacts on how the photon behaves before it enters either slit. Passive observation affects the photon back in time.



The double-slit experiment produces the same results for photons, electrons and neutrons, and has even been scaled up enormously for entire atoms. It's worth emphasising that all versions of this experiment listed above have been conducted many times, and have successfully confirmed the wave-particle duality of quantum entities.

Richard Feynman considered this 'the central mystery' of quantum mechanics, and conceded that it was 'absolutely impossible to explain in any classical sense.'

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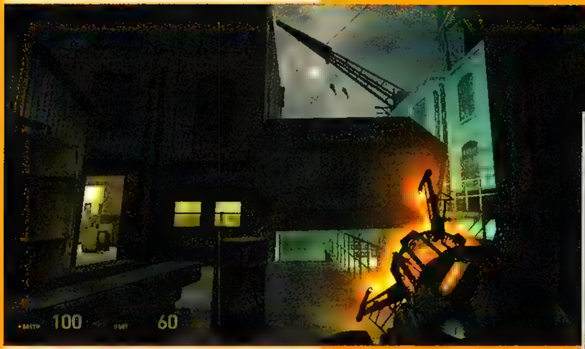
John Gillooly looks at the turbulent past behind one of the most anticipated titles in the history of gaming.

The pinnacle of compliments for a game, and one that game reviewers toy with almost as a matter of course, is: 'It's better than Half-Life.' It is hard to get a real grasp on the impact that a truly landmark game like Half-Life has had, but it stands almost isolated as the game closest to a lot of hardcore gamers hearts.

With the release of Half-Life 2, developers Valve Software and Publishers Vivendi Universal are at each others legal throats over the games development and its links to Valve Software's push into online distribution, Steam. This has been simmering for a long time, and due to hit the courts in March 2005, which will be the endpoint of a fascinating, if somewhat scary, push by Valve towards your wallets.

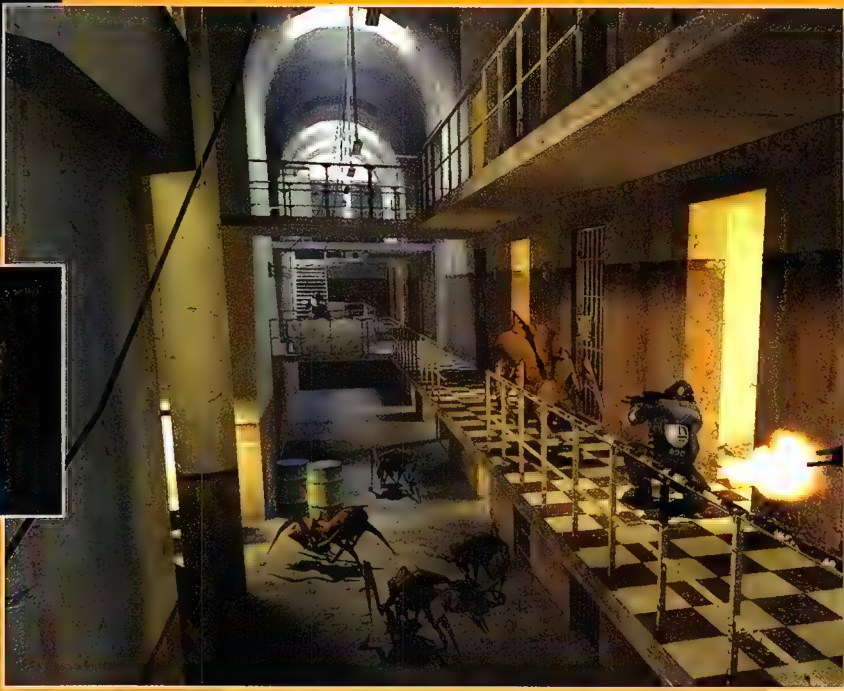
Being an endpoint the journey had to start somewhere, and the place that the journey starts is not Valve Software, but before that, at Microsoft where founders Gabe Newell and Mike Harrington were employed for over a decade. They worked on operating systems and when Gabe Newell left he was project manager on Windows version 3.0. Using the millions earned from stock options in Microsoft, Valve was born in 1996 and work started on a first person shooter using id software's Quake 2 technology. Staffed up with a number of mod-makers from the Quake community, ex-Microsoft people and a smattering of experienced game developers, Valve set about selling the Half-Life idea. After being knocked back by several publishers, Valve signed with Sierra On-Line, one of the only established US publishers without a first person shooter franchise in its line-up.

Wanting to create a shooter focused on story, not just action, Valve used author Marc Laidlaw to write the game, and involved the designers

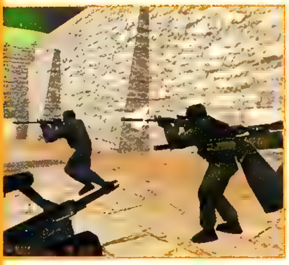


LEFT: The gravity gun was one of the first features shown when Half-Life 2 was unveiled and gained instant popularity for its physics engines manipulating shenanigans

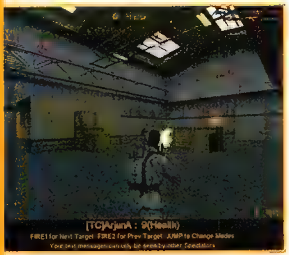
ABOVE: With games like Battlefield: 1942 implementing a lot of the promised features of TF2 it will be interesting to see what Valve can produce.



RIGHT & ABOVE: Valve's DirectX 9 graphics engine, Source, promises a lot.



ABOVE: The models, though rudimentary, were surprisingly good thanks to Half-Life's skeletal animation system.



ABOVE: From the latter beta phases, this shot shows the old CS graphics.

closely in the game development process. It also focused on developing new technology like Skeletal Animation and Artificial Intelligence, which it employed in order to make the overall gaming experience feel more believable.

After the obligatory unveiling at E3, Valve aimed to launch the game for Christmas 1997, and in what is now a legendary move Gabe Newell decided to scrap most of the game and start from scratch. This development caused all sorts of chaos, including straining the relationship between both Valve and Sierra for the first, but definitely not the last, time. It was also the first indication of Newell's willingness to venture forth and play the high stakes business game.

In the end the redesign of the game paid off, with Valve first releasing a version of the game called Half-Life: Day One, which was bundled with hardware products like Diamond's Monster Sound cards. This was actually the first 20 percent of the game, and it gave the world a glimpse into why Half-Life was so highly anticipated.

When the full game launched on 31 October 1998 it received rave reviews crowning it as the best first person shooter, if not the best PC game of all time. It acted to redefine the way developers made games and spawned a multiplayer revolution. Above all it was the kind of experience that hooked people like never before.

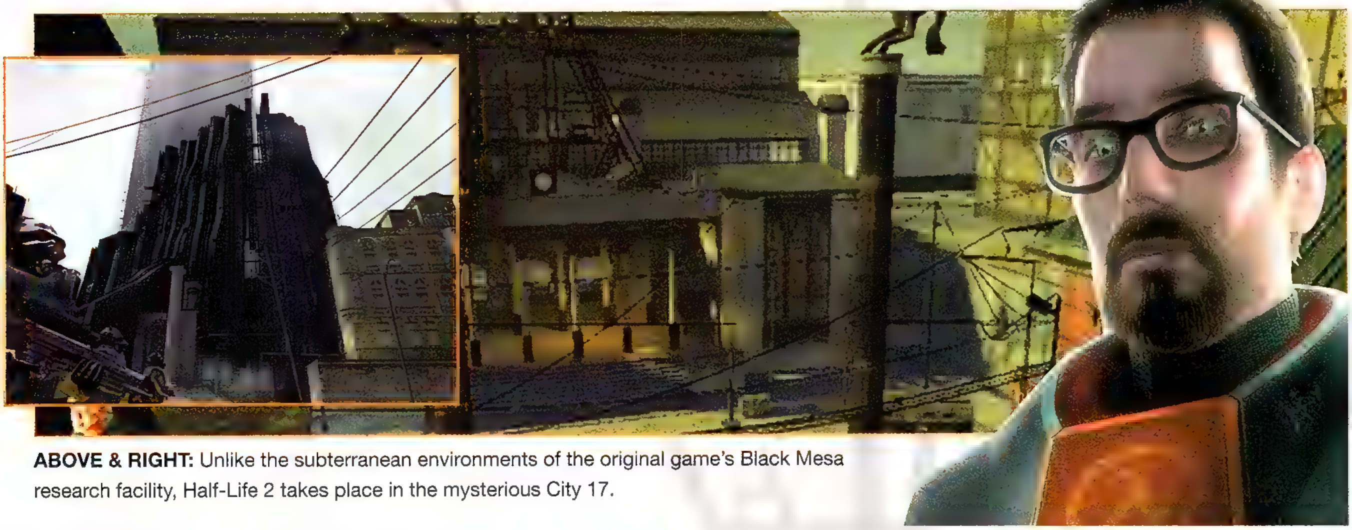
The Gooseman show

But no matter how endearing a single player experience, the thing that gives a game longevity is multiplayer. Few games manage to entrench themselves in the online gaming community, but for those that do, the rewards are tremendous. Games like Starcraft are perfect examples of how long lived a title can become.

Half-Life's multiplayer was a fairly run of the mill deathmatch, and the plan was to release Team Fortress 2 as an expansion pack to the game. This was a team-based title that was a sequel to one of the most popular Quake mods of all time. Despite two major releases of screenshots and information about the game, it continued to be delayed and has been apparently rebuilt using the Source Engine used for Half-Life 2. The Team Fortress 2 story is still to be completed, and Valve has promised to lift the lid on the game once the Half-Life 2 hoopla dies down.

In the end the salvation of Half-Life's multiplayer was a user mod called Counter-Strike, which is the shining success story of online gaming. But Counter-Strike happened almost in spite of Valve's efforts. For besides the messing around with Team Fortress 2, Valve delayed the necessary Software Developers Kit (SDK) for almost six months despite cries from the community.

A lot of mod-makers had made the switch from Quake in order to use Half-Life, but while the



ABOVE & RIGHT: Unlike the subterranean environments of the original game's Black Mesa research facility, Half-Life 2 takes place in the mysterious City 17.

modelling and some mapmaking could be done, developers needed the SDK to actually make the mods themselves. This included big names like the team responsible for Action Quake and the modeller from that project, a lone coder who went under the name Gooseman.

Gooseman first launched his mod, Counter-Strike on the 19 June 1999. It had some nasty networking bugs that made it suitable for LAN play only, but just over a week later the mod was released for internet play.

The game was basic, four maps, two skins and a handful of weapons. But its simplicity was its charm. It was damn fun to play in spite of its rough edges, and it gained a small toehold into the online scene. In Australia the Queensland Gamers League (QGL) set up a couple of servers and a few curious people started playing.

So began a regular series of beta version releases. Each brought new maps, weapons and game balance. Weapons stopped being railgun-like and started suffering recoil effects, new game modes trickled and the scoring system became robust enough to run clan matches.

By that stage it was nigh on impossible to join the QGL servers, and others started slowly popping up. It also meant that the first clans started to recruit members and by September 1999 the first Australian league was in place. From there Counter-Strike became a powerful steam train, gaining more and more fans, pumping through beta versions and then into a Valve supported final release.

Valve sponsored the end of the beta era when it rolled a complete rewrite of Half-Life's net code out in a patch. This radically changed the way CS packets did business and meant a lot of players had to relearn the subtleties of the game.

At this point Half-Life continued to sell at full price, as more and more people picked up the game to play Counter-Strike. A lot of this generation neither knew nor cared about the magnificent single player component, they wanted purely to shoot some terrorists!

Aimbots and Wallhacks

The significance of Counter-Strike cannot be understated. It was a revolution and its sheer popularity pulled what was a niche activity out of Quakeworld and into the mainstream. It was the first team game to start attracting big prize money as gaming competitions grew in stature and it turned internet cafes from backpacker and tourist email drops into legimate social destinations.

Despite the subsequent popularity of mods like Front Line Force, Natural Selection and Day of Defeat, nothing has come near to knocking Counter-Strike from its perch as the supreme online game. But it could have been much bigger if it weren't for a plague of cheating that marred the game for many years.

Cheating in Counter-Strike came in several different types. The first widely used cheat was actually exploiting a loophole in the graphics engine, whereby the command gl_zmax 0 would render walls see through. Once this loophole was closed, many software programs emerged with similar functionality. Taiwanese graphics card maker ASUS even released some drivers with this ability selectable.

The other major category of cheat was the aimbot. This would hack packets on the fly to ensure shots hit. Or in more ingenious cases coloured models were used and the crosshair locked in on those colours. Much rarer than it was actually accused of being, it was a definite problem.

There were other cheats and it was soon obvious a fix was needed. One of the postulated solutions was a system that could patch new exploits on a daily basis, leveraging the extensive network of System Admins that maintained Counter-strike servers around the world.

Opening the Steamvalve

The world first heard in depth about how this was to be done when Gabe Newell started talking about an application called Steam in 2002. In his presentation from that year's game development conference he talked of a proprietary file system and application server that was able to stream games and applications to the end user. The demo was twofold, with him showing the into sequence to Half-Life running after two minutes of data streaming, and he also displayed a copy of Relic's Impossible Creatures running over the technology.

But the kicker was that the system not only included automated patching, instant messaging and server browsing, it also included billing and authentication tools as well. Newell pushed Steam as a means of breaking out of traditional retail channels for developers.

The Steam application was released to beta at the start of 2003. This application was a less than perfect performer, and was met with wariness from the gaming community. It repackaged up the Half-Life install directories and used a new authentication system that replaced the long established WON (World Opponent Network) system that Valve and Sierra had used to verify keys when playing online. It was slow, data would get corrupted and a large chunk of the mod community didn't like it.

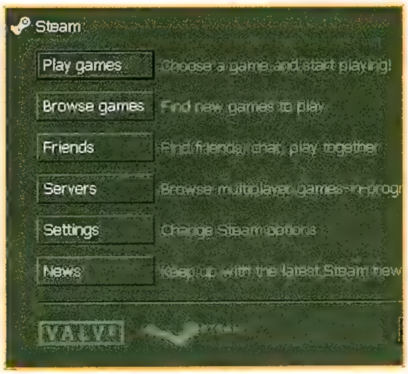
Soon came an open beta phase, but the software was still buggy and often crumbled under the load of a big release. To this end Valve brought a new member onboard the Steam staff, a software developer called Bram Cohen, who had made a huge splash in the file sharing world with a distributed downloader called Bittorrent. Cohen now works full time for Valve on the Steam system, and while Valve are coy about the details of the application, we suspect a lot of the work done to spread file serving across multiple suppliers is related to Bittorrent.

While this was happening word started to emerge that Valve were about to announce something big, and it wasn't Team Fortress 2. Just before E3 in 2003 Valve lifted the lid on Half-Life 2, one of the best kept secrets in gaming. Half-Life 2 stole the show at E3, where it was demonstrated at the booth belonging to Canadian graphics maker ATI.

But the big news was that Valve planned to release the game on the 30 September that year, a mere six months after the product was unveiled, and five years after development started. Valve's PR machine went into overdrive and it soon became clear that the relationship between it and publisher Vivendi was not a happy one.

Valve was quite aggressive about handling its own PR for the game – the use of ATI's stand at E3 was just the beginning. Soon Valve and ATI announced a deal whereby the new generation RADEON 9800XT and 9600XT cards would come bundled with Half-Life 2.

Counter-Strike was the first team game to start attracting big prize money as gaming competitions grew in stature and it turned internet cafes into legimate social destinations.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Choose a game and start playing!
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Browse multiplayer games in progr
Settings
Change Steam options
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VALVE

ABOVE: Valve's Steam authentication, server browsing, and delivery system was initially badly received by the modding community, but has since singnificantly improved.

This took the form of a voucher bearing a key code. This code enabled purchasers of the graphics cards to get a copy of the game as soon as it was released, and was a big selling point for ATI's lineup.

As September came close everything looked on track for launch. Before Computex in September last year ATI and Valve held a large party for its manufacturing partners and announced the game would slip but would make a late October release. ATI even went as far as to organise a press event for September 30, where it would unveil its cards and Gabe Newell would launch Half-Life 2.

This event, which was held on Alcatraz Island, was worryingly lacklustre and less than a storming success. Valve turned up and replayed that year's E3 footage, not mentioning anything about release dates, while ATI demoed its new card without the killer game it was expecting to run.

With the release date passing with nary a comment from Valve, who were keeping even Vivendi in the dark over what was happening. Soon news broke that the games Source code had been leaked, a saga that was verified when chunks of the game in an unplayable state started appearing online.

This was blamed for delays to the game, as a lot of the anti cheat work would need to be redone. Whether or not this became a convenient excuse is up for debate, but Valve returned to its cave and dropped the cone of silence yet again, choosing to close ranks and re-consider tactics.

By now ATI was joining Vivendi in the abandoned by Valve corner. ATI had been expecting to completely tie up the high end graphics market thanks to Half-Life 2 but now it had a real problem on its hands. At the end of December 2003 it ceased the bundling deal for the 9600XT cards and started to phase out the 9800XT cards.

Endgame

By early 2004 Valve's masterstroke was in ruins. It had taken the calculated risk of burning its relationship with Vivendi, but it also had inadvertently pissed off its third distribution prong in ATI. Steam was improving but still derided by the gaming community and Half-Life 2 was nowhere to be seen.

It demoed the game again at E3, this time in two theatres. One was in ATI's booth and the other Vivendi's. It was confident of releasing the game at the end of 2004. But first it had to release the long delayed single player version of CounterStrike, which it had bought when it hired the developer Gooseman.

Counter-Strike: Condition Zero had been bumped between developers for years. It originally started as a free form single player game under the auspices of Gearbox Software and had then been passed to Ritual and Turtle Rock entertainment. It had nearly been released, but review copies sent to media had been so badly received that the game was in limbo.

In the end Condition Zero was released by Vivendi as a budget title, and Valve used it as the test for retailing a product via Steam. It was also extensively bundled with graphics hardware, coming on discs that had unique identifiers that locked a copy to a Steam account.

At E3 Valve also let slip that the multiplayer component of Half-Life 2 would be a revamped version of Counter-Strike, using the new Source Engine. This was essentially a port with updated models and maps, but it would bring the game into the modern era of graphics and physics.

Then recently, with Half-Life 2 nearing completion, Valve opened up the beta of CounterStrike Source to cyber cafes, Condition Zero owners and ATI voucher holders. It featured a single map, the iconic de_dust, and enjoyed immense popularity throughout the gaming world.

Around the same time Valve announced a new concept for those with Vouchers, or those who wished to buy the game via Steam. It was innovatively dubbed a 'Preload' and it involved Valve streaming the Half-Life 2 content to users PCs in chunks over the months leading up to release, rather than requiring the game to be downloaded then.

With the game coming in at around 4GB this was a smart move. Previous simultaneous releases over Steam had caused the network to bog down and with the HL2 launch being so important Valve wanted nothing to mar it.

In another shrewd marketing ploy Valve released the full version of Counter-Strike to people who had paid for the game over steam as soon as Half-Life 2 went gold. In keeping with its agreement with Vivendi Half-Life 2 could not be released until the 16 November, but Valve could launch CS straight away.

Future imperfect

At the time of writing this is how the situation stands. With Half-Life 2 now released on Steam and via traditional retail channels in both DVD and CD form it remains to be seen exactly what impact Steam will have.

Valve and Vivendi are also at each others legal throats. It started when Valve sued Vivendi alleging that it was illegally selling the games to LAN cafes, and that Vivendi deliberately delayed Counter-Strike: Condition Zero. Vivendi alleges that when it re-negotiated its deal with Valve the developer played down the role of online distribution in order to secure the rights necessary to implement Steam. This is set to hit the courts in March 2005.

The initial enthusiasm by Valve over getting other publishers onboard has disappeared. While Valve and Vivendi enter a bitter legal battle over Half-Life 2, other developers do not wish to damage their relationship with publishers by using Steam.

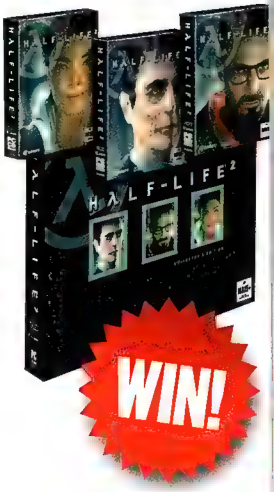
Talk to them and they suddenly clam up. We asked Leonard Boyarsky of Troika games, who is using Source for its First Person RPG Vampire The Masquerade: Bloodlines about whether they considered using Steam: 'We licensed the Source almost three years ago, which was way too early in terms of game development. I can say that there was talk of using Steam in some fashion early on, but we didn't pursue that avenue for various reasons.'

Perhaps this anecdote, said to *Atomic* by an anonymous source in the hardware world will put it in perspective. When talking about Gabe Newell and Steam over dinner one night we were told, 'Gabe is a businessman first and foremost. If he could license the Source engine for $1000 but stipulate distribution by Steam he would do it.' Even in the gaming world, the Microsoft mentality lives on.

ABOVE: While the original redefined the way people think about AI and storytelling, Half-Life 2 promises even more thanks to realistic physics.

Competitions
Copies of Half-Life 2 up for grabs

Half-Life 2 is already being crowned the greatest game of all time, and thanks to Vivendi Universal we have five copies of the retail game to give away. There are two copies of the ultra swanky collectors edition of the game, which includes Half-Life 2, Counter-Strike: Source, Half-Life: Source; a special HL2 T-Shirt and the dead sexy strategy guide/making of book. This is the package that Half-Life fans will hanker for, especially with the inclusion of the original game updated to the new engine. There are also three copies of the normal version to give away. These contain Half-Life 2 and Counter-Strike: Source and come in three versions, each showing a different HL2 character.



To win one of these outstanding prize packs, answer the following question:

What was the name of the marine that players controlled in the Half-Life expansion pack Opposing Force?

Email entries to win@atomicmpc.com.au or post them to *Atomic*, PO Box 2286, Strawberry Hills, NSW 2912. Only one entry per person. Closing date is 15th December 2004.

Encyclopaedia Atomica

First Edition

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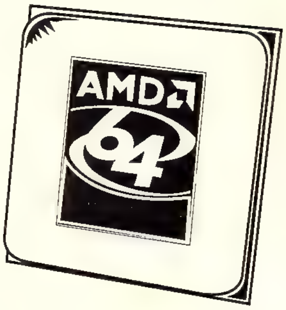
1337

One of the most iconic pieces of online vernacular is the term '1337'. In fact, it has become so prevalent it's now used to refer to the strange practice of replacing letters with numbers, a trend called '1337speak'. While rarely used as a serious description, the term 1337 is an evolution of the word 'elite'. It likely emerged from the early days of the internet and bulletin boards, and has developed into what is now a unique online lexicon.

64-bit processing



64-bit processing refers to the datawidth of registers within a CPU, which directly impacts the maximum amount of memory that the CPU can address. For desktop computing 32-bit processing has become the standard ever since Microsoft launched its first 32-bit operating system in the form of Windows 95. 32-bit CPUs under a 32-bit operating system, such as Windows 95, can address a total of 4GB of RAM (2 to the power of 32), which was deemed fine for desktop use at the time. 64-bit CPUs on the other hand can address a maximum of 16 exabytes of data (1 exabyte is equal to 1,073,741,824 gigabytes), thus allowing for near unlimited memory capacity for the foreseeable future. To enable 64-bit computing you need to pair both a 64-bit capable CPU with a 64-bit operating system – for example, AMD's Athlon 64 with Microsoft's much-delayed Windows XP 64-bit Edition.

802.11 a/b/g

802.11 is the IEEE standard for wireless networking. 802.11g is the most recent of these standards, offering a 54Mb/s peak transfer speed. It is backwards compatible with 802.11b, which only supports 11Mb/s speeds. 802.11a is also a 54Mb/s technology; however it has largely been superseded by 802.11g. In addition, there are two other standards yet to be implemented. The first is 802.11i, which has upgraded security and is designed for easy of use. The security can either be in the form of Temporal Key Integrity Protocol (TKIP) or the more robust Advanced Encryption Standard (AES), which will require new hardware. 802.11e is the second standard and is designed to ensure quality of service when streaming media wirelessly.

802.16.2004 - WiMax

Wireless broadband technology is already being sold in many areas, however these mainly use proprietary technology. The IEEE has now ratified the 802.16.2004 standard, developed in part by a technology group called the WiMax forum, for wireless broadband transmission to fixed locations. Like Wi-Fi on steroids, 802.16.2004 is designed to deliver wide area wireless networking. Exact ranges and bandwidth are still unknown at this stage.

AC '97

A set of specifications for design and layout of integrated audio hardware on a motherboard. Developed in 1996 and spearheaded by Intel, this has been the de-facto standard for integrated audio solutions since 1997. The specification supports up to four audio codecs and has evolved to support such technologies as 5.1 surround and S/PDIF over the years. It is now in the process of being superseded by the Intel HD audio specification.

ADSL

Asymmetric Digital Subscriber Line (ADSL) is a broadband internet technology that makes use of existing telephone lines rather than cable. It does this through a process called Orthogonal Frequency Division Modulation, which breaks up a signal into multiple parallel data streams that each uses only a small amount of data. This allows a broadband signal to be run over copper wires, by using wavelengths outside those used for voice transmission. ADSL however has a limited range from the telephone exchange and a new standard, called ADSL2+, is on its way to fix this. ADSL2+ allows for either much greater bandwidth if you are close to the exchange or reduced bandwidth at a much longer range than existing ADSL technology.

AGP

Accelerated Graphics Port (AGP) was released in 1997 to combat the increasing bandwidth needs of 3D graphics cards, and is essentially an elegant hack to the PCI interconnect standard. Running from the Northbridge of a chipset, AGP is a dedicated connection for graphics, now in its third and final iteration. AGP 1x was the first release, running at 66MHz and offering 256MB/s bandwidth. It was followed by AGP 2x and then AGP 4x, which further increased the available bandwidth. AGP 8x is the current version and it runs at an effective 533MHz in order to deliver 2GB/s of bandwidth to the graphics card. AGP has now been officially superseded by x16 PCI Express graphics and will be gradually phased out over the next few years.

anisotropic filtering

When rendering 3D graphics a technique called mipmapping is used to drop the resolution of textures as they get further from view. This enhances performance, but a side effect is noticeable jumps between mipmap levels and blurring of textures. Trilinear and bilinear filtering are traditionally used to smooth out these artefacts, but these techniques work best on surfaces that are flat on to view. Anisotropic filtering is used to remove artefacts on surfaces oblique to view, and does this by essentially projecting the texture filter so it lies flat to the surface. This then sharpens the textures while also making transitions between mipmaps less noticeable.

antialiasing

One of the most common image artefacts in 3D graphics are 'jaggies'. This term refers to the jagged appearance that edges can have when displayed on a monitor, and is a side effect of the very nature of the way images are displayed. Because a screen is a grid of pixels, curves and angled lines are essentially a series of offset pixels, which become quite noticeable, especially at lower resolutions where fewer pixels are displayed onscreen. To combat this graphics manufacturers use a technique called antialiasing, which runs a series of samples across the screen and blends the two sides of the edge to smooth it out. There are several types of antialiasing that have been employed over the years, including multi-sampling (in which the screen is internally rendered at high resolution and then downsized for display) and super-sampling (in which a grid is passed over the image and each edge antialiased).

Athlon 64

Athlon 64 is AMD's consumer processor series based on the AMD64 architecture. Athlon 64 CPUs have full support for 32-bit operations but also support 64-bit ones when paired with a 64-bit operating system. The major difference between the Athlon 64 and Intel's Pentium 4 is that AMD's solution features an inbuilt DDR memory controller, which provides a performance boost due to decreased latency. There are two types of Athlon 64 CPUs: the normal Athlon 64 and the enthusiast focused Athlon 64-FX. The main difference between these cores is that the FX supports dual-channel DDR memory and is multiplier unlocked for overclocking. There are three socket types for these CPUs, Socket 754, Socket 940 and Socket 939. At the moment AMD is transitioning the two processor lines to the Socket 939 platform, but Socket 754 will still exist for Sempron and Socket 940 for the Opteron server and workstation CPUs.

BIOS

Basic Input/Output System. This is software loaded onto a flash memory chip on a motherboard and used to control a PC as it boots. It basically handles the setup of PC hardware from the moment of booting through to the time the operating system loads. The BIOS is scheduled to be replaced by a more up to date technology called Extensible Firmware Interface (EFI) over the next few years.

Black Label Delta

Responsible for hearing damage to overclockers the world over, the Black Label Delta fan used on Globalwin's classic FOP-38 cooler is a 7000rpm, 60mm fan capable of some pretty impressive cooling. Unfortunately the trade-off was the fan's equally impressive ear-splitting howl.

Bluetooth

Named after the famed Viking warmonger Harold Bluetooth, this short range standard for physical communication over short range Personal Area Networks (PAN) was originally developed in 1994 by mobile phone company Ericsson. Since then it has evolved into a standard of sorts, with a 1000+ member industry body called the Bluetooth Special Interest Group presiding over it. The Bluetooth specification covers the physical communication (PHY) layer and some of the data transmission layer and is designed to allow devices such as mobile phones to communicate with the likes of headsets and PCs. It does this by using low power transmissions over the 2.4GHz wireless band. This low power limits transmission to a nominal 10 metres but it also means that interference is minimised. Because of the 'mixed'development history of Bluetooth, it is not a robust standard and both device configuration and interoperability are not as straightforward as IEEE wireless networking. At this point in time, Bluetooth is likely to be superseded by Ultra WideBand technology.

Blu-Ray

The advent of HDTV and its large data files has led the consumer electronics industry to work on next generation optical storage standards capable of much larger capacities than DVD. One of the strongest contenders is Blu-Ray, which is being spearheaded by a group of 11 companies including Sony, Panasonic, LG, Philips, Pioneer and Samsung. Blu-Ray uses a blue-violet laser to read and write data to a disc. The laser is the key to higher capacities, as its 405nm wavelength means more precision than the 650nm wavelength of the red laser used for DVD. This means data can be packed more densely onto a Blu-Ray disc. Blu-Ray also supports multiple layers of data – while DVD has a maximum of two data layers and total capacity of 9.4GB, dual-layer Blu-Ray discs support 54GB of data. Currently quad-layer Blu-Ray discs are in development with a touted capacity of 100GB and the hot rumour is that Sony's PlayStation3 console, for which Blu-Ray has been confirmed, will support eight-layer discs with a total capacity of 200GB.

broadband

Also sometimes referred to as wideband, in the strict sense broadband refers to data transmission operating over a wide range of frequencies allowing for much higher bandwidth than narrowband solutions. The precise definition of the term varies depending upon the source, but one of the more accepted definitions is a channel that is at least 6KHz wide. In terms of common usage, narrowband is used to describe traditional dial-up internet connections, while broadband is used for DSL, cable and other high bandwidth wireless internet connections.

cable internet

Cable internet uses existing pay television infrastructure to deliver broadband internet at a speed higher than that available with ADSL. While a superior technology to ADSL, the patchwork nature of cable television rollout in Australia has meant that access to cable internet is restricted to those in houses that have either Optus or Foxtel cabling nearby.

camping

Once the bastion of outdoors types, camping has also become a pastime of those who rarely venture into the UV nightmare that is sunlight. In gaming, campers find a spot and stay there, much like families who return year after year to the same caravan park. Like these caravan park visitors who arrive early to grab the good spots, in-game campers will hastily head to a tasty power up and hang around. The exception is in games like Counter-Strike, where buying weapons means that campers need never leave their spawn point.

CAS

Column Address Strobe (CAS) is a term used when referring to system memory. It defines the signal that tells a memory chip that the address data is a column address. CAS is important when tweaking or overclocking because there is an inherent latency when addressing a column, expressed as the number of clock cycles needed to perform the operation. Most DDR400 has a CAS latency of 2.5, although high performance memory will support CAS latencies of 2. Because of features added to ensure more robust addressing of large memory amounts, DDR2 533 has a standard CAS latency of four, which negates the performance boost expected from the frequency increase over DDR400.

Celeron

Intel brands its budget range of CPUs Celeron, which over the years has referred to several different processor cores of widely varying efficiency. When Intel first launched the Celeron, the 300A model became famous thanks to an almost ubiquitous ability for the CPUs to achieve huge performance boosts through overclocking. Intel differentiates the Celeron from its Pentium processor line in two main ways, firstly by using a slower frontside bus and secondly by cutting down the amount of L2 cache memory on the CPU. The current Celeron D line-up is based on Intel's 90nm Prescott core but only has 256KB L2 cache (the Prescott P4 has 1MB L2 cache) and runs at a 533MHz frontside bus.

CELL

CELL is a revolutionary new processing architecture that is being developed jointly by Sony, Toshiba and IBM. This System on a Chip (SOC) design incorporates multiple parallel processors into the one scaleable core. While little technical information has been released it is believed that CELL is based on multiple PowerPC-like cores in groups of eight, with another core controlling each one. Key to CELL is the notion of broadband connectivity by which CELL processors can leverage idle CELL chips on a network to increase processing power. Already confirmed as the heart of Sony's PlayStation 3, CELL will first appear at the end of 2004 in the form of a content creation workstation. While the architecture is certainly revolutionary, there are serious concerns that it will be a nightmare to program for, with load balancing of processor tasks key to unlocking CELL's potential.

CMOS

While the term Complimentary Metallic Oxide Semiconductor (CMOS) is most commonly used to refer to the memory on a motherboard that stores BIOS settings, it actually refers to the dominant type of semiconductor used in computing. CMOS chips feature both positive and negative circuits and are used because of high power efficiency and flexibility.

codec

A truncation of the terms compressor/decompressor, codec is a generic term referring to hardware or software that performs encode or decode operations on data. Codecs are commonly compression programs for media recording and playback, and it is used as a catch-all for everything from the dedicated AC '97 audio hardware on motherboards to downloadable software like DivX and MP3.

cold cathode

Now the most common type of internal lighting for PCs, cold cathodes are in many ways similar to fluorescent lighting tubes. Consisting of a gas-filled tube coated on the inside with phosphorescent material, both types of lighting use electricity to excite the gas particles. This causes light to be emitted in the colour of the phosphor coating inside the tube. In neon lights there is a thin filament that is heated when power is applied, and this heating excites the gas particles. In cold cathodes there is no filament; instead the gas is excited directly by the power inverter. This means that the tube does not give off heat, which is perfect for use in the temperature sensitive environment of a PC.

component video output

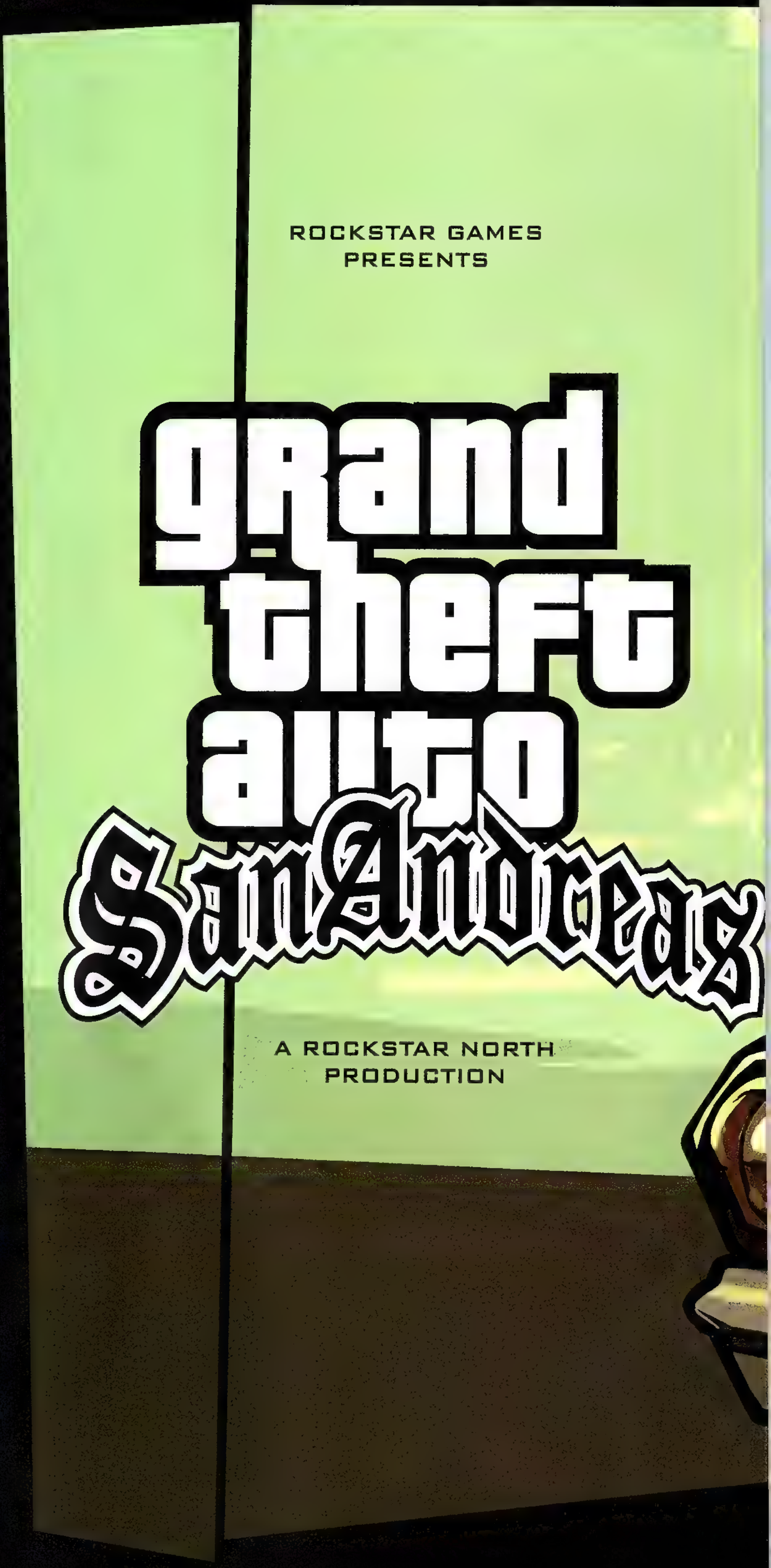
A means of connecting consumer electronic and computing devices to televisions. Offering higher quality than the common composite and S-Video connections, component video breaks the visual data into three different signals, and requires support from both devices being connected. Component video is the output of choice for HDTV signals as well as progressive scan DVD. It is possible to get component-out dongles for some graphics cards, but they are not all that common.

crate

A ubiquitous part of the first person shooter gaming genre. Used to provide cover and break up long boring corridors, crates were solidified as the gaming icon of choice by the once mighty oldmanmurray.com website (RIP) that pioneered a new games review system based on the frequency and distribution of crates within a first person shooter. But perhaps the pinnacle of the crate craze came with the now famous hidden level in the first Serious Sam game, which featured a large pyramid made entirely from packing crates. In recent years popularity has waned in favour of exploding red or yellow barrels, but look closely and you will see the crates.

DDR SDRAM

Since AMD launched support for Double Data Rate Synchronous Dynamic Random Access Memory (DDR SDRAM) in late 2000 it has become the industry standard for PC memory. DDR signifies that the memory runs at Double Data Rate, sending signals on both the rise and fall of the clock signal. This allows for greatly increased bandwidth, which is necessary to allow memory speed to scale with processors. While the official JEDEC approved naming scheme for DDR incorporates the MB/s bandwidth of the memory (eg DDR400 is officially PC3200 due to its ability to deliver 3.2GB/s of bandwidth) the commonly



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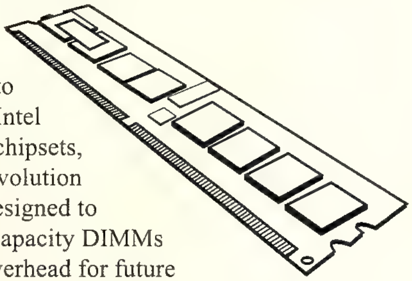
used terms refer to the effective speed of the memory (eg DDR400, which uses a 200MHz frontside bus). The first appearance of DDR memory inside the PC actually occurred with NVIDIA's GeForce256 DDR video cards, but current graphics DDR memory is an inherently different design to DDR SDRAM.

DDR2 SDRAM



Recently introduced into the desktop market by Intel for its i925X and i915 chipsets, DDR2 SDRAM is an evolution of the DDR standard designed to better cope with large capacity DIMMs while also providing overhead for future frequency increases. While still based around the same signalling as first generation DDR memory, DDR2 brings new features like improved prefetch and on-die termination. These new features add increased latency, however, so DDR2 533 will perform at approximately the same speed as the first generation DDR 400 memory does. Performance increases are expected once frequencies ramp up to 667MHz effective, which is the next stage for this evolving standard.

digital television

Traditionally television signals have been broadcast in an analog format, which is an inefficient way to broadcast data in today's digital world. Digital Television (DTV) is an evolving standard for broadcasting the television signal in digital form, compressing the data as packets for decoding via a digital television tuner. DTV-B is set to become the new standard for television over the next few years, with analog signal broadcast in Australia scheduled to be phased out in 2008. Because DTV makes more efficient use of bandwidth it allows for the possibility of more channels using the same bandwidth as analog, as well as making it feasible for the data-intensive transmission of HDTV broadcasts alongside Standard Definition DTV broadcasts. Some televisions are now shipping with digital television tuners, but owners of televisions with analog tuners will be able to receive transmissions by using either a set top box, or a DTV-B tuner card or USB box connected to a PC.

DLP

Digital Light Projection (DLP) was one of the first commercial uses of MEMS technology. It is a type of semiconductor that uses thousands of tiny mirrors to reflect patterns of light in projection devices. Pioneered by Texas Instruments with its Digital Mirror Device chips, DLP offers several advantages over LCD projection. Because light is reflected from the mirrors, it is capable of better representation of blacks than LCD; however colour is derived from a spinning wheel or colour filters over the lamp, which can cause slight colour artefacts. More advanced DLP rear projection televisions and projectors use three separate chips, one for each colour. Unfortunately this treble increases product cost due to the complexity involved in creating the micromechanical mirrors on the DMD semiconductor.

Doom

The mother of all first person shooters. While not the first, it was Doom that introduced a generation of gamers to the first person shooter genre and solidified id Software as one of the most iconic PC game developers of all time. Characterised by frenetic action and extensive use of the colour spectrum between brown and reddish brown, Doom spawned numerous add ons and two sequels, including the recently released Doom 3.

dual-channel memory

This term refers to motherboard chipsets that have two memory controllers running in parallel. This effectively doubles the memory bandwidth of the system as long as two compatible DIMMs are mounted in the correct memory slots. As processor speeds increase, so does the amount of memory bandwidth needed to ensure that the system RAM does not cause bottlenecks. While NVIDIA was the first company to introduce dual-channel DDR memory for its nForce chipset, the Athlon CPUs it supported were unable to take advantage of the increased memory bandwidth. It was not until Intel introduced dual-channel DDR memory to match its frontside bus increases on the Pentium 4 that the importance of dual-channel memory was fully realised.

dual-core CPUs

Both Intel and AMD have announced plans to launch new versions of their desktop CPUs next year that contain two processing cores on the same die. This will allow manufacturers to continue scaling the performance of their CPUs while avoiding physical limitations that are becoming more and more problematic as semiconductor manufacture moves towards smaller and smaller structures on chips. Expected to function in a similar way to traditional dual-processor systems, dual-core CPUs will improve multitasking operations straight away, but will need to be specifically coded for to take full advantage of the processing power.

DVD

Digital Versatile Disc (DVD) was designed initially as a replacement for VHS. It has since spread its wings and become the optical storage medium of choice not only for video, but also for data. It uses a red laser pickup and is based around very similar mechanics to CDs. There are various sizes of DVD starting at the single-layer, single-sided 4.7GB capacity disc right up to the dual-layer, dual-sided 17GB disc. There are several competing specifications for writeable and rewriteable DVD, with one industry group firmly behind the DVD+R standard and another firmly behind the DVD-R one, however any differences have been essentially negated thanks to near universal support of both standards by the current generation of DVD recording hardware. Industry is now looking beyond DVD as a video storage mechanism and working on a new HD DVD spec.

DVD+R 9

The latest development in recordable DVD technology is DVD+R 9 (also known as DVD+R DL). This is a dual-layer recordable DVD format capable of storing up to 8.5GB of

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data. While burners supporting this technology are now commonplace, delays with the availability of media has taken some of the impact out of the technology's launch.

DVI

While traditional CRT monitors require an analog signal from the video card to operate, LCD screens are by nature digital beasts. Rather than convert the video signal from digital to analog and back again, the industry worked up a new specification to allow purely digital transmission. This is Digital Video Interface (DVI), which is a type of cabling that can accept both digital and analog video signals. Although not common on many low-end LCD displays, most mainstream and high-end video cards sport DVI connections alongside traditional analog ones.

EFI

An ambitious project spearheaded by Intel that is aiming to replace the BIOS that handles low-level hardware interaction on modern desktop PCs with a new low-level operating system. Extensible Firmware Interface (EFI) is based on the C++ programming language and brings the notion of low-level drivers to the BIOS. Consisting of three main sections, the Pre-EFI Initialisation (PEI) phase in which code specific to the platform is run and the most basic parts of EFI are loaded comes first. Then comes the Driver Execution Environment (DXE), in which low-level drivers for the specific hardware configuration present are loaded as well as networking functions enabled. Finally the DXE offloads to the operating system and the PC boots as usual. For this to work properly the operating system needs to support EFI.

enthusiast

Marketing term used across industries to describe someone who is obsessive about a hobby. The notion of computing enthusiasts reached fever pitch late last year when Intel and AMD finally acknowledged the existence of overclockers and performance freaks, and launched flagship enthusiast processors targeting that audience.

flash memory

Used for nearly all non-volatile memory, flash is a kind of semiconductor that can act as programmable memory. The term non-volatile refers to the fact that flash memory is capable of retaining data when the power is turned off, unlike system memory. It is the basis for portable storage standards like CompactFlash, SD, MMC and Memory Stick.

FPS

Frames per second (fps) is a near universal measure of raw 3D graphics performance. Literally referring to the number of frames that a card can render every second, in common benchmarking usage it is nearly always reported as an average taken over a certain segment of gameplay.

FrisbeeMark

A means of testing computer hardware through empirical, repeatable lobbing. Based upon the 'I can trust it as far as I can throw it' philosophy, FrisbeeMark is a highly scientistic means of product testing developed several years ago by the *Atomic* Labs team. Because of the OS agnostic nature of the FrisbeeMark tests, it can be used to compare virtually any hardware product. It is also one of the few tests that can provide solid performance judgements across multiple hardware categories.

Frontside bus

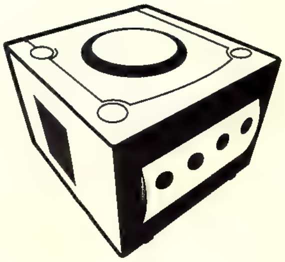
Once the speed at which the CPU interfaced with the rest of a PC, frontside bus is now mainly used to refer to the interface speed of the processor, which when combined with a multiplier gives the clock speed. Its main importance in modern systems is to provide the interface between the CPU and memory as communication with other parts of the system often uses specialised buses like HyperTransport.

Game Boy Advance

While it may be floundering in the console stakes, there is no doubt that Nintendo owns mobile gaming thanks to its venerable Game Boy brand. The most current iteration is the Game Boy Advance and Game Boy Advance SP line, which are based around a 32-bit ARM CPU core and use a 240 x 160 pixel colour TFT screen. They do not feature 3D acceleration, although some software 3D engines exist, and the screen is capable of displaying either 511 or 32,768 colours depending upon what type of graphics are being displayed. Games are supplied on cartridges.

GameCube

Nintendo's current console bears all the hallmarks of its 'we are a toy company, not an electronics company' motto. Unlike its competitors, it does not support DVD as its game storage medium, instead using a custom disc developed by Matsushita and Nintendo. It has suffered from poor third party developer support, although has been fed with a constant supply of high quality in-house titles. It uses an IBM PowerPC-based chip for processing and an ATI-developed graphics core codenamed 'Flipper' (the codename for Gamecube during its development was Dolphin). It is capable of linking with the Game Boy Advance, which can act as a controller in games that support it.



Gigabit Ethernet

Once restricted to network backbones and server-oriented applications, Gigabit Ethernet has been a common feature on motherboards for some time now.

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type company by stealth. Having successfully dominated the search engine market for many years now with website, image, news and newsgroup searching, Google has recently added both web-based email with its 1GB free storage Gmail service and also a file search tool called Google Desktop Search. Rumours abound that instant messaging or a web browser will be its next move as it continues to take over our online lives.

HD DVD

Officially settled on by the DVD Forum late last year, HD DVD is the successor to DVD. The technology being used is Advanced Optical Disc (AOD), which is a next generation optical storage format and competitor to Blu-Ray. Promoted by NEC and Toshiba, AOD uses a blue laser like Blu-Ray does to ensure that higher data density can be packed onto a disc. Unlike Blu-Ray there are several physical similarities between the AOD and DVD hardware specifications, which mean that manufacture will theoretically be cheaper than Blu-Ray, while backwards compatibility with DVD is a lot easier thanks to similarities between heads used for the two formats. Currently there are two data capacities planned – single-layer discs will be capable of storing 15GB while dual-layer discs will be capable of 30GB storage.

HD video

High Definition (HD) video is a new standard for video that is being used in some digital television transmissions and also for the next generation of movie retail. Based around a 16:9 aspect ratio, there are several resolutions that qualify as HD. The first is 1080i, an interlaced video format at 1920 × 1080 resolution. The second is 720p, which is a progressive scan, non-interlaced format at 1280 x 720 pixels. HD DVD will be based on the advanced optical disc format, as the high resolution means movies are much larger than DVD ones.

HDMI

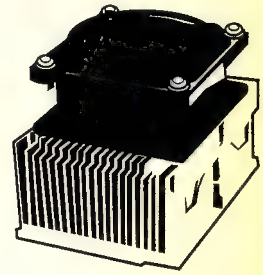
A new standard for digital connection between consumer electronics and display devices. Backwards compatible with the PC-centric DVI standard, this technology includes the ability to route audio and remote control signals as well as just video.

heatpipe

An ingenious device designed to improve the cooling efficiency of heatsinks. In some circumstances it allows passive cooling to be used where otherwise noise-creating fans would be needed. Developed by Toshiba for its notebooks, the heatpipe's most famous application is in Sony's PlayStation 2, where it is used to route heat away from the semiconductors and help quieten operation. It is essentially a sealed tube filled with water or a similar liquid. The tube is pressurised to a third of atmospheric pressure, which brings the boiling point of water down to roughly 33°C. One end is attached to the chip and the other to a heat dissipation device like a heatplate or in the case of some Toshiba notebooks the magnesium chassis itself. When heatpipes are used in desktop CPU coolers, the pipes attach to the base and run up into the heatsink, which is usually raised from the base. When the chip reaches 33°C the water boils and the steam rises to the cooler end of the pipe, where it condenses and passes heat out of the system, the water then flows back to the chip end and the cycle begins again.

HSF

A heatsink/fan combo. An essential component of the modern PC, needed to cool the CPU. The heatsink is made either of Aluminium or Copper and is machined to maximise surface area. This sits on top of the CPU and clips down to a level of pressure specified by the CPU manufacturer, with a thin layer of thermal compound used to smooth out any microscopic defects in the two surfaces and maximise heat transfer. As the CPU heats up so does the heatsink. A fan, usually of 60mm diameter is attached to the top of and blows air over the heatsink. This air then picks up heat from the heatsink fins and transfers it away from the source.



HyperThreading

An Intel technology incorporated first in the Xeon server CPUs and then in some of its Northwood-cored Pentium 4 CPUs. It is now standard in nearly all Pentium 4 and Xeon lines. HyperThreaded CPUs contain two logical processors, in which some parts of the CPU are duplicated, allowing for more efficient usage of CPU resources. In order for the full performance benefits to be seen, software needs to be coded for the technology; however it works seamlessly in operating systems that support dual CPUs. It's not as powerful, however, as having two discrete physical processors like the upcoming dual-core options from Intel and AMD.

IDE

When desktop hard drives were first released, the controlling circuitry was located on the motherboard or a specific controller card. This changed with the introduction of Integrated Drive Electronics (IDE), which is a term used to describe the integration of the hard drive controller onto the drive itself. This then interfaces via ATA (Advanced Technology Attachment) with a channel on the motherboard. There is often confusion of the terms IDE and ATA, especially since the release of Serial ATA. All Serial ATA and parallel ATA hard drives use the most current Enhanced IDE (EIDE) drive controller specification. EIDE was introduced to allow drives to directly access system memory via a technique known as DMA and brought significant performance improvements over the original standard, known as PIO or Programmed Input/Output.

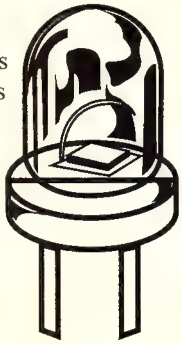
ISA

Industry Standard Interface (ISA) was the original standard for expansion cards when IBM launched the first PC. It existed for well over a decade as a 16-bit, 8MHz bus until spiralling bandwidth requirements sparked the development of PCI. ISA has now been fully phased out of desktop usage.

LAN
Local Area Network (LAN) denotes a small, localised network. The acronym has gained fame in the gaming and hardware community for its use to refer to parties where large groups of people come together and network their computers to play multiplayer games. This is now becoming big business, with the advent of dedicated LAN gaming centres and major international competitions.

LCD
Liquid Crystal Display (LCD) has been in existence for a long time, and now takes many different forms. At heart an LCD is a sandwich of two panes of glass with a liquid in between. The liquid is capable of polarising when an electrical charge is applied, and this translates to a change in opacity. The two major types of LCD are active and passive matrix. Passive matrix LCDs are more basic, with single contacts for each image segment. The perfect example of this is a calculator screen, in which display occurs by turning on or off segments of the numbers. Passive matrix screens can have contacts for each row and column, which means more advanced displays like those seen on some consumer electronics are possible. Active matrix screens have electrical contacts for each pixel on the screen, and for colour display these pixels are segmented into three filters (red, blue and green) that allow what is essentially a monochromatic technology to display full colours. Active Matrix screens are used for PCs and TVs.

LED
Light Emitting Diode (LED) is a semiconductor-based lighting device, in which a material such as gallium arsenide is excited to produce light. Different materials are used to manipulate the wavelength of light emitted from the diode in order to produce different colours of light. Because they produce constant, reliable light output they have become widespread, used for everything from rudimentary displays to torches. An evolution of the technology is OLED (Organic Light Emitting Diode).



LGA
Earlier this year Intel announced that it was transitioning its Pentium 4 processors from the Socket 478 form factor to a new pinless CPU design called LGA 775. Land Grid Array (LGA) refers to a CPU mounting system in which spring-loaded pins (in the case of LGA775 there are 775 pins) sit in the mounting socket rather than on the CPU itself. The base of the CPU features metal contacts that tightly connect with the pins once a locking mechanism is closed. This allows for better distribution of power as well as enabling the connectivity needed to the inclusion of new CPU features like onboard memory controllers or dual cores. The corollary to this is that the motherboard socket is quite fragile and care needs to be taken when mounting and removing a CPU to ensure that pins are not bent. This understandably caused major concerns within the industry as it shifted the onus for repairing bent pins from the CPU manufacturer to the motherboard manufacturers. Currently only Intel is using LGA for its desktop CPUs, however research into the form factor has also been done by PowerPC manufacturer IBM.

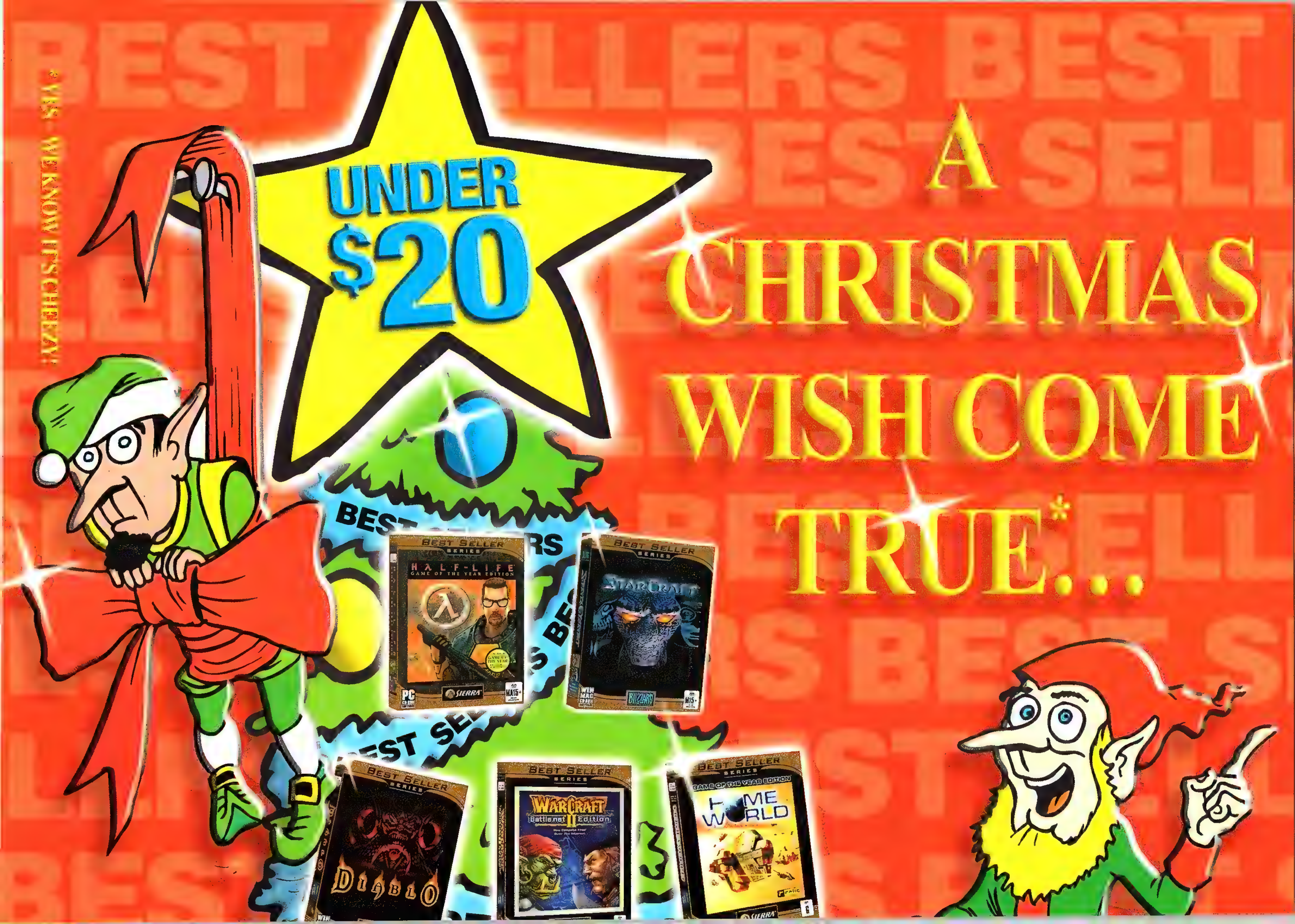
liquid nitrogen
Because it cools into a liquid at -195.8°C nitrogen is often used for extreme cooling in medical and industrial applications. It has also been adopted into the particularly hardcore end of the overclocking market, and while it is unsuitable for everyday PC cooling, with appropriate preparation of PC componentry it can be used to supercool a video card and processor long enough to go for massive overclocking records. Highly popular with people who like to battle it out on the 3DMark Online Result Browser for bragging rights over the highest benchmark scores.

MA15+
The highest level of classification for video games in Australia is MA15+ (Mature Restricted). Even though classified the same way as films, there is no R or X rating for games. For a game to receive an MA15+ certification it can feature strong themes, violence and drug use if used in context, but sexual activity must only be implied and strong language can be present if not aggressive or excessive. Games deemed to be too adult in nature for an MA15+ are refused classification and cannot be sold in Australia.

Media Center
A superset of Windows XP Professional, Windows XP Media Center Edition (MCE) has only recently been released in Australia. It is an OEM only product and requires systems be built to strict specifications. The current version is based around Windows Media Player 10, and is at heart a very fancy skin for a slightly enhanced version of this application. Media Center Edition features all the normal Media Player features but also adds the ability to record TV programs and even pause and fast forward live TV. In Australia TV recording must be done manually because of the lack of an electronic program guide, which is used overseas to allow for quick and easy scheduling of programs to be recorded. All Media Center Edition PCs are designed to work via a remote control, which comes bundled with the system.

MEMS
Micro Electro-Mechanical Systems (MEMS) is an area of technology in which semiconductor manufacturing techniques are used to create microscopic mechanical structures like gears and pumps on the surface of a silicon chip. MEMS first application was in creating impact sensors for car airbags, but since then the technology has produced DLP projectors, inkjet printing heads and even chip-level water cooling structures.

MP3
Developed by the Fraunhofer institute, this audio compression codec has entrenched itself not only as a widely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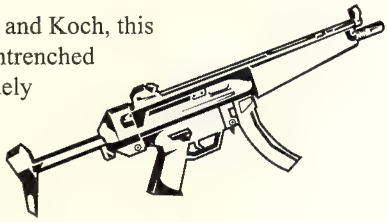
used audio standard, but has also crossed the tech divide into common awareness. For years the most popular format for downloadable music, MP3 stands for 'MPEG 1 audio layer 3' encoding. In recent times portable music players have moved away from MP3 towards files encoded with digital rights management options.

MP5



Developed by Heckler and Koch, this submachine gun has entrenched itself not only as a widely used counter-terrorist tool but it also one of the most ubiquitous weapons used in modern gaming. Featured in everything from Counter-Strike to Jagged Alliance, this submachine gun comes in several variants including the silenced MP5SD and the reduced size MP5K.

multiplier

Ever since Intel launched the 486 DX2, CPUs have featured a technology called a clock multiplier. This arose from the fact that CPU speed was increasing at a much faster rate than the rest of the system and essentially allowed the CPU to initially run at double the system speed. It was the advent of the clock multiplier that allowed for both the spiralling of clock speeds over the years and the much loved pastime of overclocking. For several years now manufacturers have been hardwiring the clock multiplier on a CPU to stop people from ramping it up for an instant performance boost.

Nintendo DS

Nintendo's latest hardware, the Nintendo DS is a handheld gaming device with dual screens. It is an attempt at reinventing gaming by changing the way people interface with games, and does so through the use of a touch screen and stylus. It also packs modified 802.11 wireless for ad-hoc network gaming. It is seen as the main competitor to Sony's imminent PlayStation Portable handheld.

Northbridge

Historically a motherboard chipset has been composed of both a Northbridge and a Southbridge, terms first introduced by Intel. The Northbridge bears the responsibility for memory control, AGP and the ever important CPU interface. With AGP a thing of the past in PCI Express systems, such chipsets only control the memory and CPU, while AMD64 CPUs integrate the memory controller onto the die, so Northbridges are rapidly dying in Athlon land.

Ogg

An open source codec, mainly used for audio, which hides from mainstream acceptance but is widely used for game audio. The name derives from some obscure computer game from years gone by called Netrek.

OLED

Organic Light Emitting Diode (OLED) is a new display technology in which a special semiconducting organic polymer is printed onto a surface using traditional inkjet printing technology. When a current is then passed through the surface using specially developed technology light is emitted. Like LCD it is a monochromatic display technology with the potential for full colour display when colour filtering is applied to each pixel. The advantage it has over LCD is that it emits its own light rather than needing to be backlit. This not only means that OLED displays are capable of true blacks but it also means lower power consumption and greatly reduced display costs. There is also the possibility of printing onto flexible material for rollup displays.

Omaha Beach

American area of operations on D-Day that Spielberg blew audiences away with in *Saving Private Ryan*, and immortalised with gamers thanks to Medal Of Honor: Allied Assault. Since then it has appeared in nearly every single World War 2 mod and commercial shooter. Thankfully now being replaced by Vietnam as the war locale of choice for game developers.

optimisation

Not a dirty word. The term 'optimisation' when applied to 3D graphics drivers is much maligned thanks to outbreaks of 'driver cheating' that occurred over the years. This involved detecting common benchmarking programs and making slight drops in image quality in order to get higher benchmark scores. When done correctly, on the fly optimisation can improve performance without any noticeable drop in image quality. The next generation of DirectX 9 games will more than likely compile shaders on the fly, which means that optimising compilers will help game performance.

overclocking

A popular warranty voiding hobby, it refers to the practice of running chips above manufacturers' specifications. It first cropped up in the early days of the PC, and took hold when Intel launched the Celeron 300A. There has been a love hate relationship between CPU manufacturers and overclockers over the years – there is an understandable fear of unscrupulous retailers overclocking a system to sell at a profit. To this end most CPUs are 'clock locked' and most overclocking must be done via the frontside bus. This practice is also common with video cards, but graphics chip manufacturers have always been a lot more open. To this end there is even driver-based automatic overclocking on some cards that uses inbuilt temperature monitoring to find a stable point, and every so often cards that retail in a pre-overclocked form. Of course, third party tools are available to help you overclock yourself.

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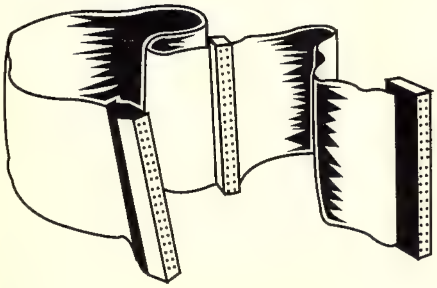
Parallel ATA

Until recently known simply as ATA, this version of the advanced attachment interface uses parallel data transfer to communicate between a motherboard host controller and an IDE controller. This means of communication has been used since the first PC was launched, and is now being superseded by Serial ATA. The disadvantages to parallel ATA mainly stem from the relatively inefficient design, which limits cable length, and the airflow killing ribbon cables it uses to connect hard drives.



PCI

Peripheral Component Interconnect (PCI) has enjoyed over a decade of use thanks to a series of elegant hacks made to improve bandwidth. Now starting the long process of phase-out in favour of PCI Express, we still expect to see PCI slots on motherboards for several years to come. In the current PCI 2.1 specification the bus runs at 33.3MHz and offers 133MB/s of bandwidth. There are many variants of the technology for server and workstation use, but these have not made their way to the desktop. It is being phased-out because the combination of low bandwidth and competition for resources due to its hub-style architecture are limiting the introduction of new technologies like HDTV tuners and Gigabit Ethernet.

PCI Express

Originally codenamed 3GIO (3rd Generation Input/Output System), this Intel-spearheaded technology has finally begun to be rolled out onto the desktop. Designed to provide more robust communication and higher bandwidth than PCI, it has been tailored from the ground up to exist for at least 10 years. Key to its scalability is the flexible nature of its design. Communication is broken up into data paths called lanes. Each offers a bidirectional bandwidth of 250MB/s that for example allows Gigabit Ethernet to operate at its full speed of nearly 2GB/s over a single lane connection. Bandwidth scales with the number of lanes so for example graphics cards connection via a 16-lane interface delivers 4GB/s of bandwidth in each direction. While there is no measurable performance different in today's games between PCI-E and AGP, there is already a major boost in performance to be seen when editing large HD video files.

Pentium 4

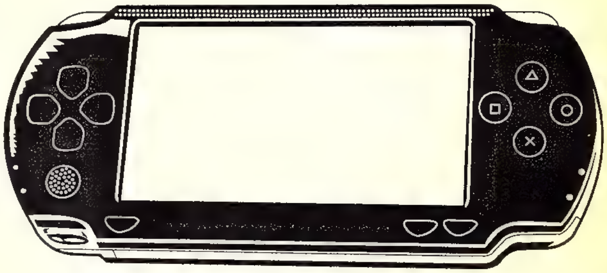
Intel's current flagship desktop CPU has had a rough history. When it launched as the Willamette core back in 2000 it heralded the introduction of a new architecture, but one that wasn't as efficient on a clock-for-clock basis than its predecessor. It was also marred by an exclusivity deal that tied Intel to only supporting the expensive and proprietary RDRAM. It was not until Intel launched the Northwood-cored processor that enthusiasts started to take notice of the product line and when paired with DDR RAM it regained a lot of respectability. Currently suffering from incredibly high heat output with its 90nm Prescott core the line is due for a dual-core makeover late next year. Last year Intel launched a new product in the range, the Pentium 4 Extreme Edition, which used the Gallatin core from Intel's Xeon line-up and added 2MB of L3 cache to the processor to boost the chip's performance.

plasma

While plasma is the fourth state of matter, in the technology world the term (unfortunately) mainly refers to plasma display technology. Like most new display tech, plasma involves trapping something between two panes of glass. In this case it is an inert gas that emits photons. Each pixel on a plasma screen is actually comprised of three discrete sub pixels in order to produce colour imagery. While perfect for commercial displays thanks to their high contrast ratios, they do possess a limited lifespan, after which the whole panel needs to be replaced. Likely to be superseded by Active matrix OLED technology in coming years.

PlayStation 2

When Sony launched its PlayStation, few tipped it to launch the successor from such a dominant position in the console market. Now quite old, and recently replaced with a sleek, tiny new model, the PlayStation 2 is still the most popular console of this generation. It uses custom chips developed by companies Sony, Toshiba and IBM. One of the major reasons for its success was its ability to play DVDs, which helped push the medium in the marketplace. Over recent years Sony has been successful in bringing new ways of gaming to the console, with the popular EyeToy and SingStar games opening up new markets.



PlayStation Portable

After starting the portable media revolution with the Walkman, and conquering the console market, a feat deemed impossible when it launched the PlayStation, Sony are taking gaming mobile with the PSP. With a large TFT screen, dedicated 1.8GB Universal Media Disc (UMD) for storage and grunt nearly equivalent to the PlayStation 2 the PSP could well be the next must-have gadget for the iPod generation. As its Japanese launch nears, doubts still remain over battery life, but recent relaxing of attitudes on the MP3 audio file format is positive news for the portable media side of the equation.

PowerPC

IBM's line of processing cores used in everything from Apple's Mac and iMac lines of computers to the upcoming successor to the Xbox. It is a 64-bit Reduced Instruction Set Computing (RISC) CPU with dedicated vector processing hardware capable of multiprocessing and multicores. The desktop variants are usually based on server cores and the current top-end core is the G5, which is used in Apple's latest Mac desktops.

Pr0n

An inevitability of the internet, pr0n is the 1337speak word for porn. Like any new technology, the porn industry got behind the internet, in a manner of speaking, early on and few will acknowledge that it was, and still is, one of the biggest drivers of broadband adoption. A large collection of pr0n is seen as a mark of one's manliness by certain segments of the geek community.

RAID

Redundant Array of Inexpensive Disks (RAID) refers to the ability to run two or more hard drives in combination to increase the speed of disk-intensive tasks and/or maintain a backup copy of all data in case of disk failure. Originally the domain of fileservers and high performance workstations, IDE-based RAID has become commonplace on modern motherboards and is now being incorporated as standard in most Serial ATA-supporting chipsets. It is being pushed heavily for backup purposes in the new rafter of digital media-focused home theatre PCs that are riding on the back of Windows XP Media Center Edition and the digital home industry initiative.

RAS

Working hand-in-hand with CAS in PC system memory, Row Address Strobe (RAS) is a signal sent to inform the memory of the row location of data being accessed. RAS latency refers to the number of clock cycles it takes for the signal to be processed, and lower RAS latencies will improve system performance in memory-intensive tasks.

RDRAM

A much reviled proprietary memory technology developed by RAMBUS. RDRAM uses serial signalling to provide much higher bandwidth than DDR and technically while a superior technology it floundered due to poor support and eventually was phased out of desktop usage. The major reason for this was the industry standard nature of DDR memory, which made for lower costs and much greater supply. In the end DDR won out as a standard for PC system memory. It is also used in other devices such as Sony's PlayStation 2 console.

Refused Classification

The place where games go to die in Australia. Even though games are rated to the same criteria as films, the maximum possible classification is MA15+ for interactive titles. With a rise in the number of games focused at mature audiences in recent years there have been an increasing number of games receiving a Refused Classification, the most notable being Grand Theft Auto 3, which was subsequently edited and reclassified MA15+; Manhunt and Leisure Suit Larry: Magnum Cum Laude.

Revolution

Always cagey about its hardware products, Nintendo let slip that its next console was codenamed Revolution. Little is known about the console, apart from the fact it will be using an IBM processor and ATI graphics core. ATI are also developing the core for Microsoft's Xbox 2, however the development teams for the two projects are kept separate.

rheobus

A device used to control the speed of fans within a PC. So named because they were traditionally a collection of rheostat dials used to adjust fan speeds, the term is still in fairly common usage when referring to electronic fan controllers used in a PC.

Rockstar North

Once known as DMA Design and now a wholly owned part of Take 2 Interactive, this Edinburgh-based development studio made a name for itself with the game Lemmings. But it hit the gaming stratosphere with a series of titles that go under the moniker Grand Theft Auto. While the original Grand Theft Auto titles, which were top down 2D affairs, were cult classics, it was the move into 3D that made Grand Theft Auto one of the most iconic franchises in gaming. It has now released three such titles – Grand Theft Auto 3, Grand Theft Auto: Vice City and Grand Theft Auto: San Andreas. It was also responsible for developing the notorious title Manhunt, which was recently banned in Australia after being on sale for a year.

SATA

While there were no pressing bandwidth issues for the switch, SATA (Serial ATA) has been introduced to the market as a replacement for parallel ATA connections to hard drives. Based around serial communication this technology provides more simplified communication and adds the ability to hot-plug desktop hard drives while also eliminating the airflow-blocking ribbon cables that are needed for parallel hard drives. The technology needs only four wires, two for upstream and two for downstream, with three ground wires. This means the cables are thin and there are no master-slave drive relationships. SATA has allowed technology like 10,000rpm drive speeds to flow from the server space onto the desktop while simplifying power consumption and the creation of RAIDs.

SATA II

The next generation of the SATA spec is now starting to be adopted on desktops. While most hard drives cannot push

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data fast enough for SATA's 150MB/s throughput rate, SATA II ups transmission rates to 300MB/s. It also brings a new technology called Native Command Queuing (NCQ), which re-orders commands for optimal use of the drive heads.

Scientistic

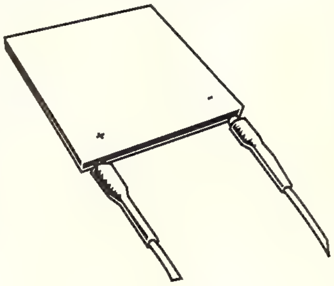
A favoured tool of marketing, scientistic is a term used by *Atomic* to refer to the dubious use of science to prove alleged facts. Practitioners are referred to as 'Scienticians'.

SDRAM

Synchronous Dynamic Random Access Memory (SDRAM) refers to the basic type of system memory used in modern PCs. In common use it refers to the older non-DDR memory type, where the memory ran at the same speed as the frontside bus. Synchronous refers to the memory access being tied to clock speed, while dynamic refers to the way that the RAM stores each bit of data in a separate capacitor. Now superseded for desktop use by DDR SDRAM.

Sempron

AMD's new budget line of CPUs, it is available in two distinct types. The first uses Socket A and is based on the 32-bit Athlon XP core. The other is also 32-bit only but is based on the Athlon 64 core. This Socket 754 version sports the same integrated memory controller as the Athlon 64 and this delivers decent performance despite the cut-down 256KB L2 cache used in the CPU.



shaders

Term used to refer to the major part of modern 3D graphics hardware. Programmable shaders are now the standard for such products and are used to give flexibility to developers and improve the quality of desktop rendering. Based on a parallel processing model, there are two kinds of shaders in a modern GPU. These are called Vertex and Pixel shaders, terms which refer to the type of operations they do. In hardware these are dedicated floating point processing pipelines that run custom operations on data to produce more realistic graphics. Used extensively for lighting effects, programmable shaders are present on all DirectX 8 and DirectX 9-level graphics hardware. The next generation hardware will do away with the two types of shaders and instead turn them into flexible arrays with software load-balancing for more efficient use.

Southbridge

In the desktop PC architecture designed by Intel the Southbridge handles peripheral interconnect functionality, the audio interface, networking and drive control among other things. While the functionality of the Northbridge is diminishing in modern PC systems thanks to the likes of companies such as AMD and Intel, the Southbridge is going strong. Single-chip solutions for the Athlon 64 are basically slightly tweaked Southbridges.

S/PDIF

Sony/Philips Digital Interface (S/PDIF) is a consumer electronics-derived standard for digital audio connectivity that has become common on modern PCs. There are two types of S/PDIF: the first uses optical transmission and the other employs standard cable connections. The optical version is by far the most common and has become a popular way of connecting PC systems, game consoles and consumer electronics devices to surround sound systems.

S-Video

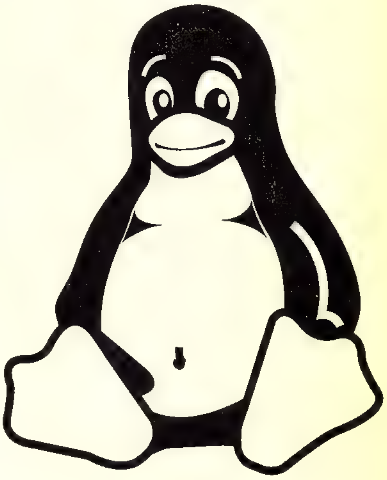
A very common means of connecting video devices, S-Video has a quality somewhere in between composite and component output. Most PC graphics cards use S-Video-based TV output via the distinctive DIN plug that it uses. This cabling separates the colour information from the luminance and chrominance information, which makes for better images over the short cable distance. Unfortunately S-Video suffers from a loss in quality when cables of around 5m lengths or above are used.

TEC

A means of extreme chip cooling, Thermoelectric Cooling (TEC) also goes by the name Peltier, so caused because of the physical effect it uses to cool. In a TEC a special material is used to create a small tile. When current is applied, one side of the tile becomes incredibly cool and the other side incredibly hot. This creates a heat pump, sucking heat from the cool to the warm side. When paired with a heatsink/fan to remove the excess heat, TECs are incredibly effective at reducing chip temperatures. They are not in wide use however because of the need for more juice than can be supplied by a PC PSU.

TMD fan

The Tip Driven Magnetic Fan (TMD fan) was announced a few years ago to much fanfare, but there has been little delivery on promises. In TMD fans there is no traditional motor to drive the blades, rather the blades are metallic. Small magnets in the corners of the fan cause the blade to spin. This makes for quieter operation than normal fans and it eliminates the dead zone usually experienced under the fan motor.



Tux

This irascible little penguin is the mascot for the Linux operating system.

Ultra Wideband

The postulated standard for the next generation of peripheral connection to PCs, Ultra Wideband (UWB) refers to a means of data transmission where the signal is broken across a wide range of the radio spectrum. Designed for low power and high short range bandwidth, the UWB standard is 802.15.3a and defines the physical transmission layer over which wireless versions of existing protocols can operate. It is expected that wireless versions of FireWire and USB will use the technology as will a new generation Bluetooth standard.

Valve Software

Developers of Half-Life and Half-Life 2, this US game developer is much loved thanks to the quality of its games. Now in the midst of a grab for a chunk of the online distribution market with its content delivery system Steam, Valve also owns Counter-Strike, the world's most popular multiplayer mod.

Vapourware

A term used to denote a game that has been long promised but never delivered. Thankfully not as common in usage as it once was, the last great Vapourware games of note were Warcraft 3 (but Blizzard have time and time again proved themselves perfectionists and the game was great), Team Fortress 2 (okay, we will forgive Valve because it has given us Half-Life 2) and Duke Nukem Forever (see 'When it's done').

VFD

Vacuum Flourescent Display (VFD) is a small output screen rapidly growing in popularity over passive LCDs, especially for home theatre PCs. Also commonly used in PC fan control and system output displays that sit in 5.25in bays.

VIVO

A lot of companies provide Video In/Video Out (VIVO) functionality on graphics cards, usually at a small price premium. This allows the card to both output video (which is what a graphics card is for after all) and also take in video input allowing digital preservation of an analog signal. Nonetheless, it is inferior in quality to a purely digital connection like USB or FireWire.

W00t

One of the most enduring terms to emerge from the world of 1337speak, 'w00t' has become the ultimate expression of joy for net dwellers. While the origin of the term is couched in mystery, EverQuest players insist it arose as a truncated cry of celebration when questing was rewarded with 'Wondrous Loot', it is definitely up for debate. Some other potential origins include rap music, Quake or the original 1337speak types, hackers.

water cooling

Another popular method of PC cooling, water cooling uses a similar radiator-based means of cooling the system to that seen in motor cars. Rather than a heatsink, a water block is placed over the CPU. This block has two pipes, an inlet and an outlet, and these connect to a pump and radiator to form a sealed system. The radiator pumps water through the block where the water picks up heat from the CPU. This heat is then dissipated when it passes through the fan-cooled radiator. Once seen as an extreme measure, water cooling has slowly become a more and more accepted option for both overclockers and lovers of silent computing.

When it's done

The Mantra of the Broussard; corporate motto of 3D Realms; deflector of doubt over Duke Nukem Forever. After years of delays on Duke Nukem Forever, Realms finally decided to shut up and just say the game would be released when they finished it. After years of failed projects like Prey (are Human Head working on a Doom 3-engined Prey?), there is a morbid fascination with the company and many a bet has been placed as to whether it or Valve Software's Team Fortress 2 will be released first.

Windows

Openings between inside and outside, smaller than door-sized (not even French doors). Usually filled with a pane of glass that allows clear viewing. Available in many different models.

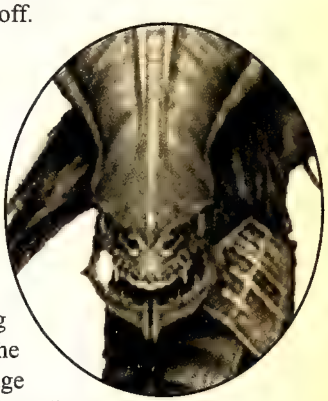
Xbox

After enduring many years of rumours and speculation, Microsoft finally launched Xbox, its salvo into the console world in November 2001. While it has not managed to break Sony's stranglehold on the industry, Xbox has slowly gained mainstream recognition and is now widely accepted as the number two in the console industry. It is based around PC hardware in the form of an Intel CPU, NVIDIA chipset and GeForce3-level graphics and runs a highly customised version of the Windows 2000 core. Designed to work closely with the popular Xbox Live broadband gaming service, the console brought several innovations to the market including an inbuilt 8GB hard drive.

Xenon

The rumoured codename for Xbox 2. With everything pointing to Bill Gates lifting the lid on this next gen console at January's Consumer Electronics Show, in his now-confirmed opening keynote, speculation is rife about the system. Leaked specs that were more than likely early ideas pointed to a tri-PowerPC core and load-balanced shaders in the ATI graphics core. Microsoft is staying tight-lipped, knowing as soon as one company announces a next gen console product the gloves will come off.

Zerg



One of the shining icons of modern multiplayer gaming, the Zerg is a race in Blizzard's Starcraft. Known for their ability to overwhelm in large numbers one of the most enduring game strategies is the Zergling rush, where the weakness of the race is negated by building huge numbers of Zergling units and sending them *en masse* into an enemy base.

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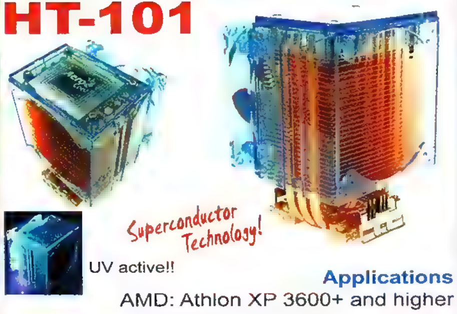

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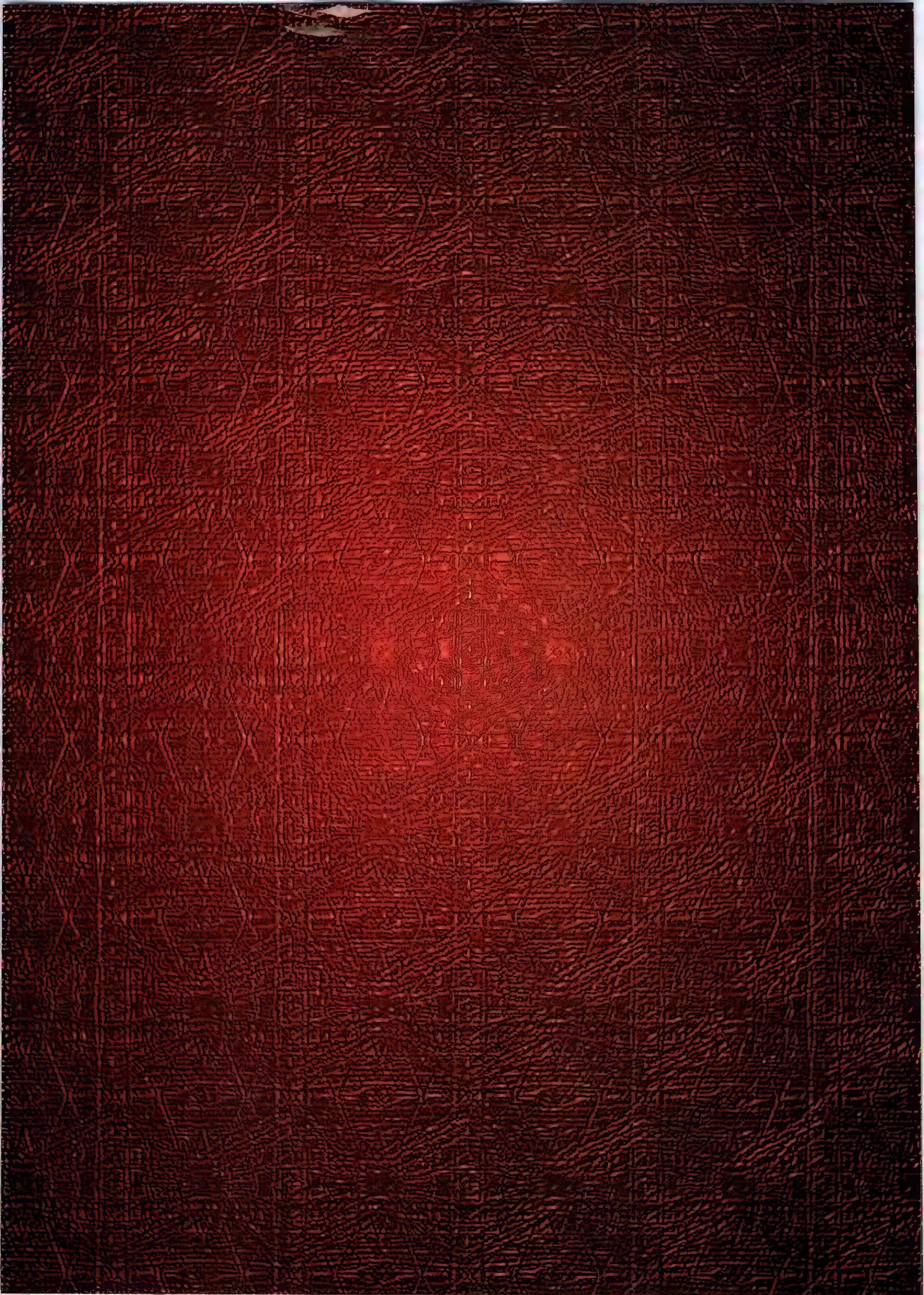

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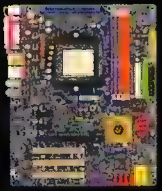

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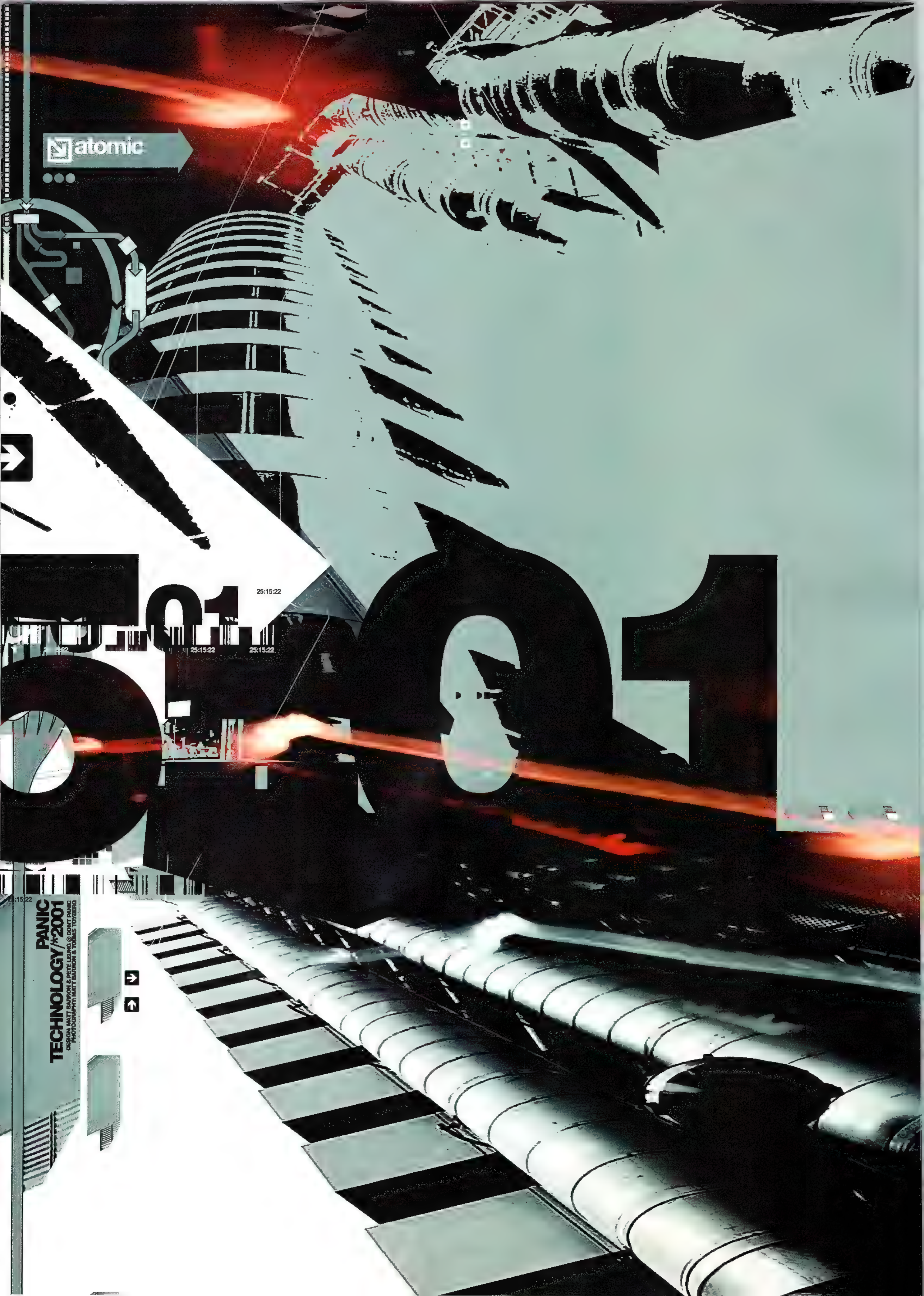
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DESIGN: MATT BARRON & PETE LEUNG @ DONT PANIC
PHOTOGRAPHY: MATT BARRON & TOBIAS TOYBERG

Reviews

In the frame

Benchmarketing has led many astray of late so John Gillooly explains why *Atomic* tests.

At times the internet is nothing more than a place for self aggrandised bitching and moaning. It happens everywhere, and hardware enthusiasts have their own special field of bitch-pertise, that of 3D graphics.

Don't get me wrong, the world of 3D marketing is jam packed with tit-for-tat and all sorts of Machiavellian tricks in the fight for our graphics dollar, but every now and then the online spectators of this battle get caught up in the excitement and wade in.

This is why the term 'optimisation' is now treated with the same disgust as the word 'aimbot' is in online gaming. It is also why the reasons for benchmarking have been obscured by some of the more hotheaded members of the online community.

So why does *Atomic* benchmark? Not to show you how certain pieces of hardware perform in certain games, rather it's to inform about the range of differences between hardware that you're looking to buy.

It sounds like the same thing but it isn't, and this is something I believe needs reinforcing given the current climate of online benchmarking. When we test graphics hardware at *Atomic* we come at the product from several angles. Firstly we look at performance in current titles. We choose these carefully to avoid games that are CPU bound. We also choose games that are taxing on the graphics subsystem, which is why Far Cry has become a regular visitor to the *Atomic* reviews section.

We then look forward as best we can, and this is where one of the more controversial aspects of benchmarking comes in. To do this we need to use that mainstay of the testing suite, the synthetic benchmark. Synthetic benchmarks are 'pure' benchmarks rather than real world applications. The most widely known synthetic benchmark is 3DMark, which has suffered the slings and arrows of outrageous flaming over the years.

But 3DMark is the best available metric for gauging how a video card will perform a year down the track. The only other possible option would be to use pre-release game code, but our experience with alphas and betas over the years means we realise full tweaking of graphics performance comes very late in the development cycle, visual effects keep being added and performance will vary in different builds. This combines to deliver a varying and unrepresentative performance picture.

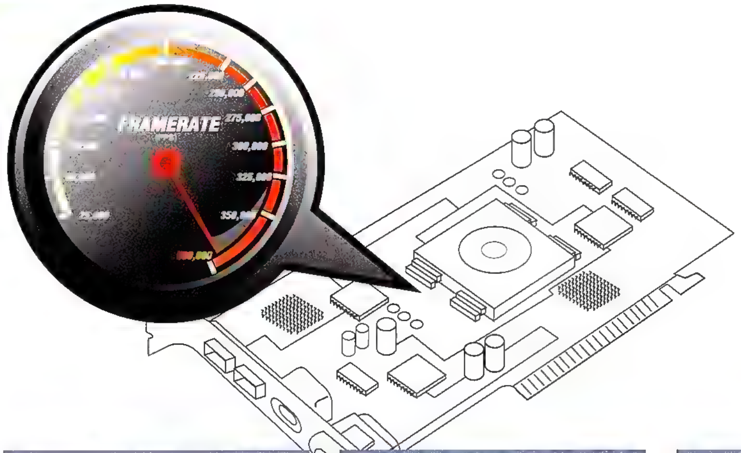
3Dmark takes the trends and philosophies of game design and distils it into a forward looking program that lets us see how a video card will run when games become the normal mapped, bling-phonged, realistically lit shader porn they are destined to be in a year or two.

Don't get me wrong. Making a thousand dollar purchasing decision solely based upon 3DMark performance is a bloody stupid thing to do, but it is a priceless component of any well-rounded benchmarking toolkit.

Being 'well-rounded' also means we won't be using Doom 3 as one of our core benchmarks. No, not because NVIDIA has 'optimised' its hardware for it, but rather it is a small outpost of OpenGL in a DirectX world. Half-Life 2 is more likely to make it into our suite as it is a widely licensed DirectX 9.0 title, but we do have significant concerns over the near intrinsic linkage of Valve and ATI over the course of the game's development.

The key is to think critically and to expect optimised drivers. It is a reality and will only become more so as realtime compilation of shaders becomes part of games. The good thing is that now both NVIDIA and ATI give you the option of turning filtering optimisations on and off. Try turning them on and see if you can spot a difference. If you can't, then for the love of god enjoy the performance boost rather than scanning screenshots for subpixel differences. After all you could apply 1024 tap anisotropic filtering to a wall, but it won't look any different to trilinear unless the surface is at an oblique angle to the screen.

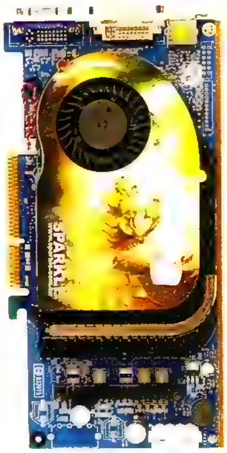
Don't just swallow everything thrown at you. Be critical and realise that benchmarking is more than knowing you only need to run the game tests to get a 3DMark score. Do this and I promise *Atomic* will continue to deliver relevant and realistic benchmarking to make sure you make the best use of your cash.



Framerate

Warning: The following content may shock slideshow operators.

Sparkle GeForce 6800 GT



Specifications: NVIDIA GeForce 6800 GT; 256MB 256-bit GDDR3 RAM; 400MHz dual RAMDACs.
Core speed: 350MHz
Memory speed: 1000MHz
Price: $735
Supplier: Australia IT
www.australiait.com.au

Packaged in one of the most obscenely oversized boxes we've seen, this almost-Ultra card is not unlike other GTs – a top balance of price and performance, performing well above the 6800 and barely below the 6800 Ultra. It even has a side metal bar to allow for easy insertion. The fan, not surprisingly, is about as loud as we've grown to expect from NVIDIA – that being louder than it looks capable of. Nonetheless, this single-slot card is definitely a gamer's best friend.

PowerColor
www.powercolor.com.tw

PowerColor X800 Pro

Specifications: ATI RADEON X800 PRO; 256MB 256-bit GDDR3 RAM; 400MHz dual RAMDACs.
Core speed: 475MHz
Memory speed: 900MHz
Price: $725 ($755 VIVO)
Supplier: Australia IT
www.australiait.com.au

Obviously not as fast as the XT, or the XT PE for that matter, the performance of this card is still up with the best when it comes to high detail gaming, and if you don't want to shift over to PCI Express just yet.

It comes with Hitman Contracts to keep you breathing until you can get your hands on Half Life 2 – although, you probably have it by now, so scrub that idea.

Another slightly more affordable card for high end gaming with the bonus of less-torturous cooling.

PowerColor
www.powercolor.com.tw

Gigabyte RADEON 9250

Specifications: ATI RADEON 9250; 128MB 128-bit DDR RAM; 400MHz dual RAMDACs; VIVO.
Core speed: 240MHz
Memory speed: 400MHz
Price: $TBA
Supplier: Synnex
www.synnex.com.au

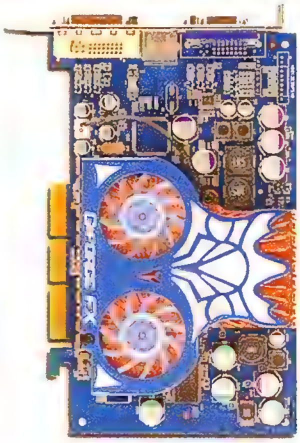
Thanks to the onboard ATI Rage Theatre chip, this card is fitted with VIVO support. It even has the port that devices can plug into to use this chip, which we think is pretty incredible.

Built using eight modules of 4ns TSOP 128-bit DDR memory, the best part is that it is actually not running at its peak speed and would be completely capable of being bumped straight up to a safe 500MHz – try it and see.

That, and attached to a quiet fan, Mr T says 'shove this up your HTPC'. In, even.

Gigabyte
www.gigabyte.com.tw

Albatron FX5700Q

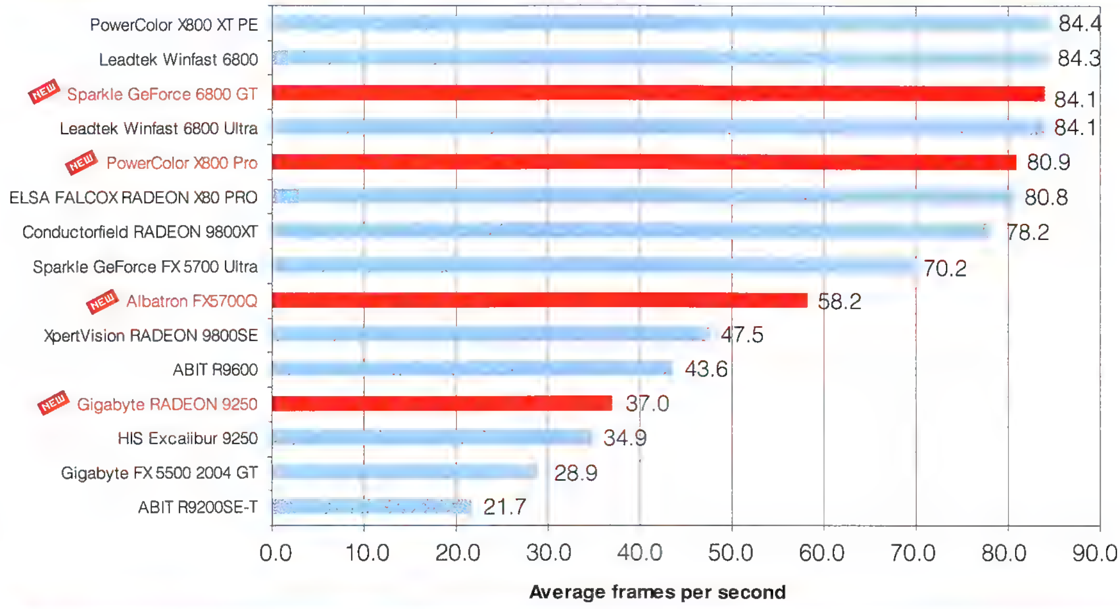


Specifications: NVIDIA GeForce FX5700; 256MB 128-bit DDR RAM; 400MHz dual RAMDACs.
Core speed: 425MHz
Memory speed: 500MHz
Price: $TBA
Supplier: AMI Computers
www.ami-computers.com.au

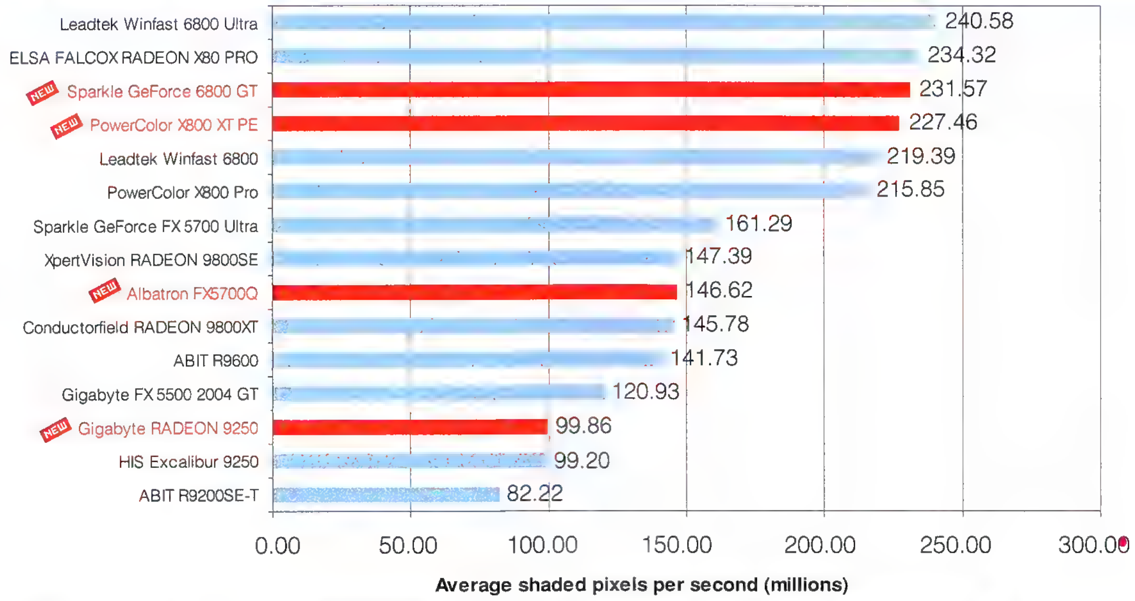
With a heatsink resembling the quintessence of a Transformer and two small fans sounding much like a mini vac, this card could be useful in warding off the night ghouls. Or even drawing up some low end 3D. With 256MB of memory, unless someone comes up with a GFX-based RAM drive, we doubt over half of that will ever be put to good use. It beats the 9250, but this card wouldn't work in a HTPC considering its noise levels. Best aimed at those who are on a low budget.

Albatron
www.albatron.com.tw

Call of Duty



AquaMark3



Video cards

With the mid range fleshed out thanks to the launch of the RADEON X700 and GeForce 6600 series cards NVIDIA has finally rounded out its top to bottom Shader Model 3.0 line with the GeForce 6200. Positioned against ATI's X300 series, the 6200 is a four pipeline, 128-bit DDR memory GPU. Like the X300 it uses a 0.11 micron process and is PCI-Express native.

This now means ATI has a top to bottom DX9 solutions with the RADEON X300, X600, X700 and X800 series chips, while NVIDIA has gone one better with top to bottom DX9 Shader Model 3.0 support with the GeForce 6200, 6600 and 6800 products.

Besides a few minor tweaks to existing designs, the product lines should remain stable until the next round of core announcements sometime next year. Maybe by then ATI and NVIDIA will be producing enough high end parts to keep up with demand.

CPUs

Just when we were getting used to an 800MHz front side bus Intel has launched its first 1066MHz effective FSB processor. This LGA775 Pentium 4 Extreme Edition processor runs at 3.46GHz and requires a i925X based motherboard with updated BIOS to run.

While Intel hasnt launched any other CPUs, AMD has launched both a new flagship Athlon 64 FX CPU and a new top end desktop Athlon 64. While both these CPUs use the Socket 939 form factor, the FX 55 runs at 2.6GHz and is purely a speed bump from previous FX models. The new Athlon 4000+ desktop CPU on the other hand runs at the same frequency as the 3800+ but doubles the L2 cache to 1MB. This makes the 4000+ almost identical on paper to the previous high end Athlon 64 FX 53 CPU, the only real difference being that the FX sported an unlocked CPU multiplier for easier overclocking.

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Website:
MSI
www.msicomputer.com.au

Phone:
MSI (02) 9748 0070

Price:
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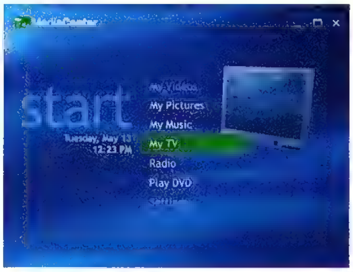
MSI MEGA 865 Enhanced engineering sample; 2.8GHz P4 CPU; 256MB DDR RAM; 100GB HDD; front panel display; analog TV tuner; Combo drive; Windows XP Media Center Edition 2005.



This wild and crazy digital media revolution that everyone keeps talking about has mostly passed Australia by in recent years. Sure, we have swathes of MP3 players and media centric products, but Microsoft's Windows XP Media Center Edition (MCE) has not been available in Australia.

This is both a good and bad thing; while we have missed three generations of the OEM only superset of Windows XP that is MCE, it means that the version launching in Australia benefits from three generations worth of product development.

Key to MCE is what is called a '10 foot user experience'. This basically means that the interface is designed to be readable from a distance, and navigable via the remote control that comes bundled with all MCE systems. Beneath this lies Windows XP Pro sans support for active directories.

Central to MCE is Windows Media Player 10 with added support for television recording. The remote and interface simply allow for much easier control of media playback functions from 10 feet away. It does feature some other handy additions like a version of MSN Messenger designed to be used via the remote as well but this is basically a tweaked up, reskinned Media Player focused version of Windows XP.

Television recording is the major addition to this mix, and while all the recording functions are available to Australian users, there is no local support for one of the ease of use aspects of MCE, namely the Electronic Program Guide (EPG). MCE will support EPGs, however it remains up to the television stations themselves to actually implement the technology.

An EPG allows users to simply select a program from the TV guide downloaded from the net. It is simple and easy, and has been a key part of MCE overseas. From our talks with vendors in the lead up to MCE's launch the best anyone expects is that this will be implemented for Digital TV only in a few years time.

In fact, according to Microsoft Digital TV isn't even supported by the Australian version of MCE, although there are already systems floating around the Aussie market with multiple Digital TV tuners in them. The only problem we foresee is congestion of the PCI bus when running multiple HD TV streams.

The more cynical amongst us will undoubtedly treat MCE with disdain - after all we have been using our PCs as a media box for years, and plugging them into televisions ever since the first buggy implementations appeared on graphics boards like the Riva 128 and ATI RAGE 3D II.

So it begs the question: what Microsoft can bring to the table that cannot already be done with third party apps like MyHTPC or the Linux based MythTV? The key is the combination of simplicity and very slick integration of the remote control and interface.

While us hardware nuts actually enjoy things like spending several hours with a remote control and software like Girder (the defacto industry standard for remote control configuration) in order to customise the experience perfectly, your average computer buyer neither knows nor cares that you can do all of this on your own. They want a box that works, and this is the biggest thing in MCE's favour.

This stems from the OEM nature of the product and fairly regimented design specifications. Hardware and drivers need to be certified to work with MCE, which helps stability and means a smoother end user experience. It means that those of us who insist on building our own systems will miss out on the experience, but it also means that the product is perfect for the less tech savvy types out there. Or to put it another way, this is an easy and hassle free solution to recommend to those friends and relatives that tend to ask for PC buying advice - as long as they are prepared to pay the few extra hundred dollars above a non-MCE system.

Hardware manufacturers can indeed differentiate their products through the inclusion of multiple TV tuner cards, RAID and 3D cards. For example, the MSI product we used for our testing used an engineering sample i865G based MEGA 865 Enhanced Small Form Factor system (the products MSI will be shipping will differ in that they will use an ATI chipset) with a 2.8GHz Pentium 4 CPU, 256MB RAM and 100GB of hard disk space. But MSI has done a lot of work integrating the display on the front of the PC with the MCE software, so it not only displays what mode MCE is in it also shows such information as what TV channel is running and how long you have been recording for.

Windows XP Media Center Edition is an incredibly easy to use piece of software, even if it is little more than a version of Windows XP SP2. Not only is the interface slick and intuitive, it also by far the most enjoyable experience we have had attempting to control a PC via a remote. JG

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Design for Innovation

ATI RADEON X700 XT

Does it slaughter the 6600GT? Nathan Davis pipes down to the vertex level.

Supplier:
ATI
www.ati.com

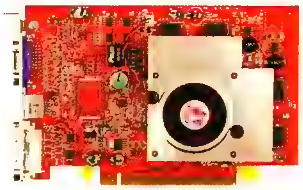
Website:
ATI
www.ati.com

Phone:
N/A

Price:
N/A

Specifications:

ATI RADEON X700 XT GPU; PCI-Express; 0.11-micron process; 475MHz core; 128MB 1050MHz effective 128-bit GDDR3 memory; eight pixel pipelines; six vertex shaders; Shader Model 2.0b support.



ATI have held the keys to the video card Holy-Grail-maker for quite a considerable time. That was the age of AGP. We're now at the dawn of a new era, that being PCI Express, and finally some fierce competition has reared its beautiful head. Last month the 6600 GT completely blew us away. As was noted, the X700 card would have to do better than the X800 in Doom 3 to run on par with the 6600 GT. Mainstream cards don't normally outperform high performance ones, but this is an entirely different interface. Anything could theoretically happen. Pigs might fly, after all.

The X700 is only available as PCI-Express and is essentially a chopped down X800, featuring fewer pixel pipelines – down to eight, from 12 or 16. Clock-wise, it is comparable to an X800 Pro, with the same core of 475MHz but with slower 128-bit memory sitting at a higher and more effective 1050MHz.

As a derivative of the X800, the X700 core relies on Shader Model 2.0 (with some extra instructions, raising it to SM 2.0b) with 24-bit floating-point precision. This is as opposed to NVIDIA's 6000 chips that have full support for Shader Model 3.0 running on a higher 32-bit floating point. However, neither SM 2.0b or 3.0 are actually in high demand as of yet.

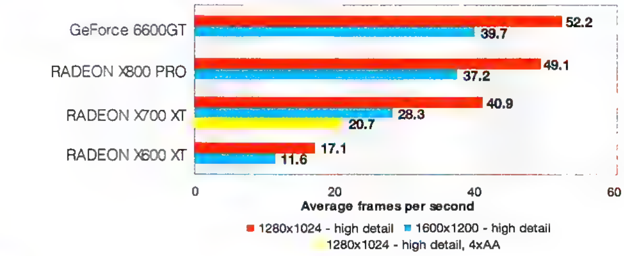
With a shiny retail badge of US$199, ATI have hailed this six vertex shader card as having twice the vertex shaders as the competition in the same price range. These shaders are particularly useful with low end animation at the very base level – dynamically modifying or animating existing vertices on a model and using this at the Pixel Shader level to create shadows, for example. The added bonus of having more vertex shaders gives more power back to the CPU for other geometric calculations. Far Cry makes good use of these, but as you can see from the results, it didn't seem to actually help any great deal.

In fact, the card didn't pull off any surprises, leaving us totally anti-climaxed. There is a negligible boost in 3D Mark 2003, but it still doesn't manage to pull *it* off, performing, overall, nowhere near the brain-blowing 6600GT. As expected from ATI, it managed to handle antialiasing relatively strain-free, but our tests demonstrate it just plain can't beat its rival card.

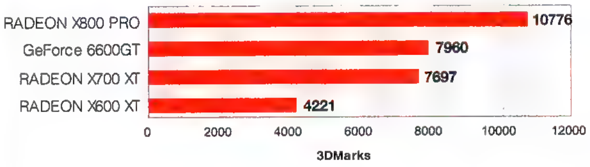
ATI have been known in the past for their quiet, well-cooled and powerful cards. What really seized our guts was the incredible noise output. The X700 is a hot little beast when pumping the goods but it's outrageously thunderous for a mid range card when cranked up. Think of the kids!

There's no doubt it is a great mainstream card, delivering quality-rendered, playable frames. On the other hand, however, NVIDIA have really leap-frogged this round with the 6600GT bounding off and making its mark as the new king of the mid range arena with the option of doubling the power, thanks to SLI. Overall, while your ears won't be that happy, this card has its advantages. ND

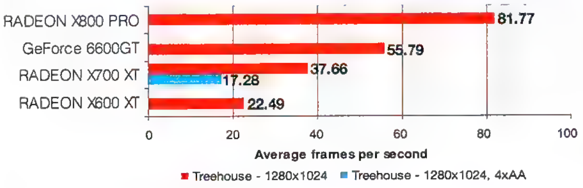
Doom3 – Demo 1 – High Quality



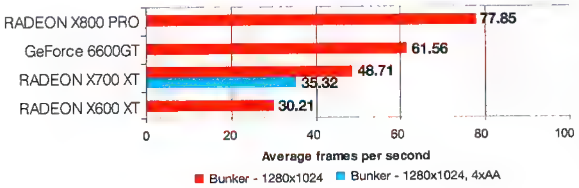
3DMark03



Far Cry – Treehouse – 1280x1024



Far Cry – Bunker – 1280x1024



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www.albatron.com.tw

Phone:
AMI Computers
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Price:
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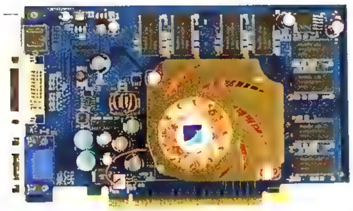
Specifications:
NVIDIA GeForce 6600 GPU; PCI Express; 0.11-micron process; 300MHz core; 128MB 500MHz effective 128-bit GDDR3 memory; eight pixel pipelines; three vertex shaders; Shader Model 3.0 support.



As SLI support is currently only on the GT and Ultra range of cards, the GeForce 6600 doesn't have the SLI expansion option. It's for the much lower end of the midrange market anyway, so the folk purchasing this wouldn't, and in fact shouldn't, want to double its power, as the benefits would be minor, regardless of a doubling in speed.

Unlike the path ATI chose to go down with the selection of BGA memory for all X700 cards, even the slower ones, this one uses eight 4ns TSOP modules, both rated and running at an effective speed of 500MHz. The 6600 has a reduced core clock to 300MHz.

It comes equipped with 'HDTV support' and what this *actually* means is it has a component video dongle. Obviously not solely for HDTVs, but they require a component signal to display 720p or 1080i. Aside from that, it's *the* term for the marketing goofs, even without excessive use of the seemingly de rigueur letter 'x'. Deviations aside, component is a damn nice addition to the card. The dongle also has an s-video output, but if you can use component, that's by far the preferred path.

The GF 6600 range only comes built with three programmable vertex shader pipelines, unlike the X700 series' six vertex shaders, relying instead on the CPU to perform a large portion of this. Fabricated on a 0.11-micron process, this card doesn't get all that heated when under full strain and thankfully the fan is quiet.

hotaward

Testing on our i925X system had it performing consistently above the X600 XT, delivering 4480 3DMarks in 3DMark03, 31fps in Doom 3 at 1280 x 1024 and hitting 36.1fps in our Far Cry Bunker test.

Overall, the SLI-equipped GeForce 6600 GT is the gaming card. The slower 6600, with performance hitting the scale between an X600 XT and the X700 XT, makes a damn good option for a HTPC with the added bonus of occasional gaming. **ND**

SCORE 9/**10**

PowerColor X700 Pro

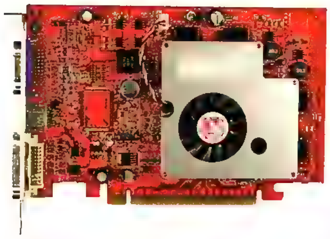
Supplier:
Australia IT
www.australiait.com.au

Website:
PowerColor
www.powercolor.com.tw

Phone:
Australia IT
(03) 9543 5855

Price:
$420

Specifications:
ATI RADEON X700 Pro GPU; PCI Express; 0.11-micron process; 425MHz core; 256MB 860MHz effective 128-bit GDDR3 memory; eight pixel pipelines; six vertex shaders; Shader Model 2.0b support.



Unless you're reading the mag back to front ('Fool! You'll kill us all!'), by now you know what midrange card doesn't wobble our jocks. Enter exhibit B. With double the memory, this is the underclocked edition of the X700 XT reviewed on the previous page.

Like the X700 XT, the X700 Pro has 128-bit GDDR3 memory, eight pixel pipelines, six vertex pipelines and runs on PCI-Express with x16 native lane support. The only aspect that ATI has changed is the core and memory frequencies, both of which run at 425MHz and an effective 860MHz, respectively. A significant drop, particularly for the memory.

Speaking of which, ATI are continuing a bizarre trend. If a cheaper edition of a card is to be made – which usually means it will be slower, as is the case here – why throw more memory on it? 256MB isn't going to be used greatly as of yet anyway and as it's BGA, this bumps the price up. Unless they're preying on the gits who think that memory is everything. And black computer cases *are* faster.

It looks like this is the final cooling design for the X700 series. Luckily the Pro edition doesn't reach such screaming levels as does the X700 XT with its auto-adjusting speed levels. That said, this is still quite loud for a slower midrange card.

The scores we pulled are directly relevant to the X700 XT results (and last month's 6600GT preview). It's a Pentium 4 EE 3.4GHz with 2GB DDR2 all packed on a i925X based motherboard. It falls consistently below the X700 XT except in Far Cry which surprisingly spurted out 48.21fps in our Bunker test. This is practically identical to the X700 XT, all thanks to Far Cry's use of the programmable pipelines. It drew up 6383 3DMarks in 3DMark03 and 32.9fps in Doom 3 at 1280 x 1024.

This card came equipped with an obligatory copy of Hitman: Contracts. If that's enough to get you swinging to a new PCI Express setup, we won't stop you. It's a free country. **ND**

SCORE 8.5/**10**

DViCO TViX

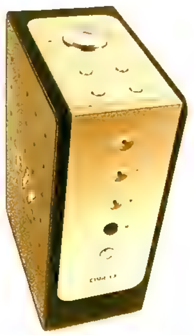
Supplier:
PC Case Gear
www.pccasegear.com.au

Website:
DViCO
www.tvix.co.kr

Phone:
PC Case Gear
(03) 9584 7266

Price:
$339

Specifications:
Portable multimedia jukebox; USB 2.0; supports DivX, XviD, AVI, VOB, DAT, MPG, PCM, MP3, Ogg Vorbis, WMA, DTS and AC3; flash upgradeable; IR remote control; composite, s-video, component video; optical and coaxial audio; requires 3.5in PATA HDD.



It doesn't have TV in or even an Ethernet port, but slated as a portable multimedia jukebox, these functions are not the idea behind it. This is a portable USB 2.0 external hard drive chassis that you whack in a PATA hard drive of your choice and use to not only store and retrieve data, but also play media files and view image slideshows on the TV. This is not meant to be a home theatre PC, but essentially a portable 'Sneakernet' device that has gone large, with the ability to plug into a TV or other composite, component, s-video or optical-wielding device and spit out the contents. And this it does damn well.

It has the ability to output high quality media via an impressive selection of signal types and supports outputting video right up to 1920 x 1080 – albeit, interlaced – NTSC or PAL and this is all entirely configurable. Handy.

At the time of writing, it has the inbuilt function to read MPEG1, MPEG2 (AVI and VOB) and MPEG4 (AVI, DivX, XviD) video formats. There was no support for ASF, WMV, 3ivX and other file formats, but future means are highly possible, and likely, as one of the great abilities of the TViX is it can easily be flash updated. Just copy the binaries over to the unit, plug it back into the telly, boot it up and load the files.

The file systems it supports are FAT32 and NTFS – that considered you don't need to insert a brand new hard drive. You can easily whack in an existing one and continue to use the data on it. Multiple partitions are also supported.

For DVD movies, all you have to do is copy all the files directly off a DVD to the TViX and it performs the magic, reading the files as if still on a DVD, with the menus and other options still in place.

It may be a tad pricey, but it's truly one of the most fully kitted-out external hard drive gadgets we've seen. Definitely something worth considering. **ND**

hotaward

SCORE **9/10**

OCZ DDR Booster

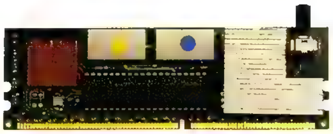
Supplier:
Australia IT
www.australiait.com.au

Website:
OCZ
www.ocztechnology.com

Phone:
Australia IT
(03) 9543 5855

Price:
$95

Specifications:
DIMM mounted volt modifier; powered via pass-through 20-pin ATX adaptor; increase VDIMM voltage up to 3.9V; LED voltage level display; requires additional cooling for 3.4V+.



We'd love to see more insane products like this chunky DIMM device. As you're aware, bumping up the DIMM voltage helps increase the stability of more higher memory frequencies. Volt modding the motherboards are the current but risky method to make way for significantly higher voltages than a motherboard would otherwise allow, but often contenders for FrisbeeMark eventuate.

Finally the hard yards have been done for you, at least in regards to VDIMM modifications. As a result, this inspired DDR1 VDIMM modifier saves the hassle of killing components before you get started on upping the voltage. This doesn't make it safer than having a successful volt mod. Increased volts are still just as potentially damaging to the memory, but you can now keep your mobo warranty.

The Booster's primary function is to ramp up the amount of available voltage to 3.9V max, but it also helps with the delivery of a cleaner juice supply. It does steal a DIMM slot, so be warned if you have full DIMM slots. The exact voltage being pumped through is controlled via the mounted potentiometer and displayed on the two LED units. In case the voltage isn't being displayed correctly as per factory calibration, there is an adjustable variable resistor just below them to let you know what's going on.

Once the voltage hits 3.4V, extra cooling is required as both the memory and the Booster rise significantly in temperature.

A major problem we came across was an unavoidable design dilemma. Not all boards have the DIMM slots arranged the same, so if the shorter end of the DIMM notch is pointing down, you're going to lose two slots (unless you use the slot closest to the CPU) and have less access to good airflow.

Before leaping up to grab one, be sure to check the OCZ website's compatibility list, as several popular boards unfortunately don't support it. If you're a zealous overclocker, this ingenious, albeit slightly expensive device is exactly what you might want for your next overclock.

Volt modding is now more accessible, and that's just a little scary, but kudos to OCZ for leaping ahead with an entirely new and useful gadget. **ND**

hotaward

SCORE **9/10**

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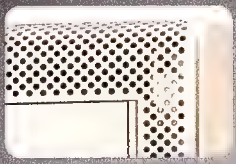
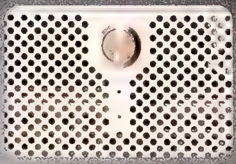
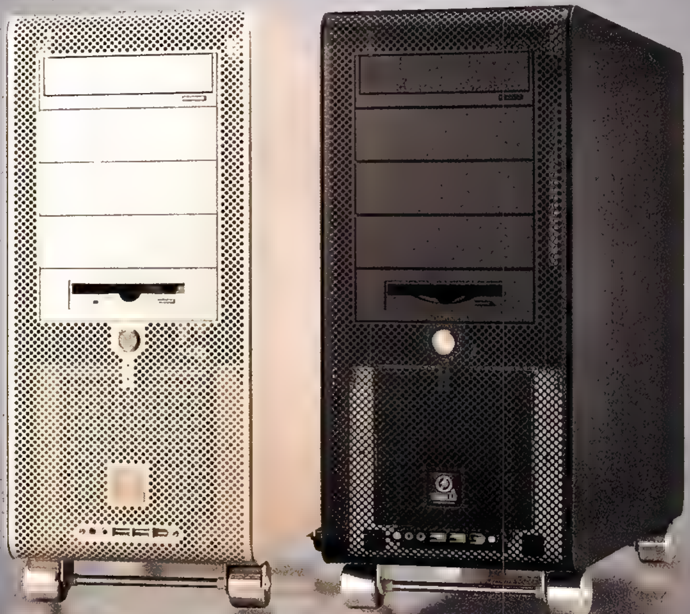

Perforated panels allow for improved ventilation


High quality stainless steel power button

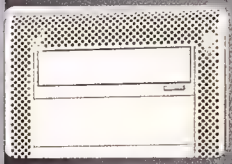
5.25" bay converted to 3.5" bay with aluminium FDD bezel (5 x 5.25" bays)

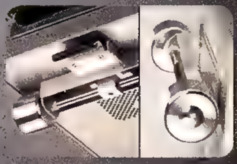
12cm ball bearing fan with filter, removable sound damping cover and anti-vibration rubber ring in rear panel



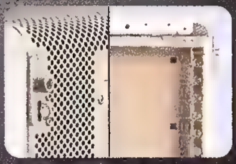
Multi-media I/O (IEEE 1394/USB/MIC/EAR)

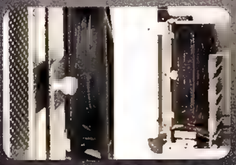
Separate power supply zone with holes for cables


Aluminium CD-ROM bezel


Aluminium casters with brakes

Sliding tracks for easy assembly of HDD (6 x 3.5" bays)

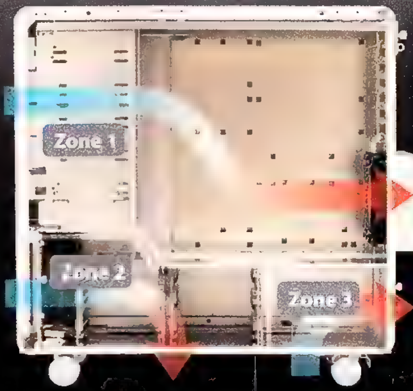

Captive screws allow for easy removal of side panels


12cm ball bearing fan with filter and anti-vibration rubber ring in front panel

"...one of the standout cases on the market, with a price tag to match" (Atomic Magazine)

"...there is hardly a flaw to be found in the entire PC-V1000" (Tom's Hardware Review Site)

"Lian Li have always made cases that look great and don't rattle, but the V1000 takes it to a new level" (Dan's Data Review Site)



Zone 1
Rear 12 cm fan is located next to the CPU Cooler

Zone 2
Front 12cm fan is located next to the HDD

Zone 3
Power supply fan circulates cool air from the bottom of the case out through the rear panel

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DVD Family	DVD ± RW	
[illegible]	[illegible]	[illegible]
Write	16x	8x
Rewrite	4x	4x
Read	16x	16x
CD Family	CD-RW	
Write	48x	
Rewrite	24x	
Read	48x	
Data Buffer Memory	[illegible]	
Support Media	DVD: DVD single/dual layer (PTP/OTP), DVD-R, DVD+R, DVD-RW, DVD+RW | CD: All CD-ROM/R/RW formats	

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ASUS Star Ice

Supplier:
ASUS
www.asus.com.au

Website:
ASUS
www.asus.com.au

Phone:
ASUS
1300 799 833

Price:
$79

Specifications:

Socket 478/A/940/939/T heatsink; speed controlled single ball bearing 80mm fan; fan range from 1000rpm to 4500rpm; six heat pipes; 880g weight.

'Whoa [insert expletive]!' – this pretty much sums up the fear-inspired theme from when this made the trip through *Atomic* HQ. There is no doubt about it: it's one of the most freaky, big-arsed heatsinks ever.

Weighing in at 880g, it's no light twinkle fairy. In fact, in a seemingly worrying trend, it's the heaviest we've ever looked at. The weight is of great concern, as the heatsink pulls an insane amount of pressure on the motherboard, considering the majority of the damaging weight is in the copper fins that are suspended out from the board.

The attachment requires a mobo to have mounting holes, as it clips on using its own retention system which screws in from behind the board. This is good in order to get a tighter fit, but it won't fit the boards without said holes. Honestly, *lucky them*.

At 4500rpm, the Star Ice really tackles heat like, in all mannerisms, a high-powered jet spray to damp paper. It's also as damaging to the ears at full speed and luckily it comes with a potentiometer to lessen the auditory-wrecking effects at 1000rpm. Shamefully, there's no dial to lessen the terrible weight.

Albeit, this mofo of a HSF is a damn good cooler. It's the most effective air-based cooler we've tested – and we sorta expected that. Cooling comes at a price: the balancing of efficiency and how many suburbs you wish to quake.

Popping the monstrous critter onto Socket 478 enabled Chernobyl in an ambient room temperature of 24°C, the end result was painfully good. At 4500rpm, it settled on a chilly 44°C, increasing to 52°C when on the far more tolerable 1000rpm.

Rip-snortingly beastly on the ear canal, the mobo and heat, this is for people whose motto is 'bigger and booming is better'. Break stuff. Create a gravitational force in your case. Make the cows come home. If cooling means so much to you that you're willing to sacrifice all for the chilliest air 'sink around, you'll love this. **ND**

SCORE **7/10**

Thermaltake Fanless 103

Supplier:
Thermaltake
www.thermaltake.com.au

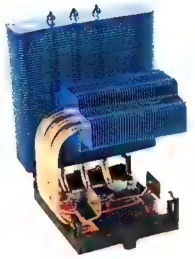
Website:
Thermaltake
www.thermaltake.com.au

Phone:
Thermaltake
(03) 9763 1622

Price:
$79

Specifications:

Passive Socket 478/A/940/939 heatsink; six heat pipes; copper base; aluminium fins; 750g weight; thermal goop sachet.



From the inventors of Plastinium (a secretive chemical-alloy of plastic and aluminium) comes another physics rebelling heatsink. With a heatsink/heatpipe design seemingly attempting to emulate that of the ICE cooling system in Shuttle's small barebones systems, this here 750g-worth of passive heatsink promises a Zen-like silent system. That's right, folks; this, apparently, does not need a fan.

It supports the Intel Socket 478 platform by default, with the standard four-point retention mechanism. It can also be popped onto a K8 mobo, only it must use the same retention clip, so this requires the replacement of the standard plastic K8 heatsink retention bay. This process feels weird. Kinda like forced cross-breeding and as a bonus, it is a strange sideways implementation of the clip. Getting it on is a little annoying, but it's tight. Like a tiger.

Now, instead of continuing on with the thermal-dynamics lecture involving 'how stupid it is to expect actively heated ions to magically go all chilly because if any heatsink is going to work at all without the aid of liquid nitrogen or helium, there needs to be air movement', we thought, 'screw it'. So we let it perform the honours.

After smearing on a thin layer of thermal goop, we slapped the aluminium copper beast onto the Intel-equipped Chernobyl and dialled her up to the usual 80W in 25.5°C ambient. We're pretty damn sure we were close to witnessing the first ever heatsink to become an electron accelerator. We only let its ever increasingly time-space-separating-self up to 120°C, though. We thought it best to flick the poor tortured Chernobyl off before it scorched through the Lab's testing bench. Even with a 120mm 35.2CFM fan blowing directly over it, this dropped to a still mighty unimpressive 73°C. Given this breeze was more direct than the pre-heated air movement from a couple of case fans, this temperature would rise in a case.

Plus, if the fins were bent up on a 45° angle, it has the potential to make an all-in-one cheese grater *and* melter. **ND**

SCORE **1/10**

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[illegible]

- PCI Express x16 and 128-bit Memory Bus
- 128MB GDDR3 Memory
- 8 Pipeline Architecture
- Support HDTV
- Support SMARTSHADER™ HD, SMOOTHVISION™ HD, 3Dc™, HYPER Z™ HD and VIDEOSHADER™ HD

GAME Entertainment

[illegible]

AGP 8X and 128-bit Memory Bus
128MB DDR Memory
Support CRT, DVI-I and TV-Out
Support SMARTSHADER™ 2.0, SMOOTHVISION™ 2.1, HYPER Z™ III and VIDEOSHADER™

[illegible]

- AGP 8X and 64-bit Memory Bus
- 128MB DDR Memory
- Support CRT, DVI-I and TV-Out
- Support SMARTSHADER™, SMOOTHVISION™, HYPER Z™ II, CHARISMA ENGINE™ II, FULLSTREAM™, VIDEO IMMERSION™ HYDRAVISION™

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Sydney Office: 02 9648 4658
Melbourne Office: 03 9551 8298
E-mail: sales@kingmax.com.au

APC TravelPower Backpack

Supplier:
APC
www.apc.com

Website:
APC
www.apc.com

Phone:
APC
1800 652 725

Price:
$240

Specifications:

Three input power plugs; USB charger port; easily accessible pockets; spill-proof detachable pouch; shock-absorbent padding. Contains adaptors for Compaq, Dell, Fujitsu, Gateway, HP, IBM, Panasonic, Sony and Toshiba notebooks and Motorola, Nokia, Samsung, Siemens and Sony Ericsson mobile phones.

At first glance, APC's TravelPower Backpack with included TravelPower adaptor kit is the ultimate in travel power accessories, as the name 'TravelPower' so eloquently declares. The question is what doesn't it recharge – the package includes a multitude of power plugs for Australia, the US and Europe, as well as airplanes and car cigarette lighters. It's pretty much technology's answer to electronic multiculturalism, and if it doesn't let you fit snugly into every slot, port, hole or plug in the world, then there's something wrong with you.

Also accompanying this dizzying array of cabling are adaptors for a range of mobile phones, laptops and PDAs, including Sony Ericsson, Nokia, HP and Dell. There's also a USB mini-hub, so you can charge or power USB devices, such as mobile phones, with USB power cabling.

While this may sound simply fantastic for the travel aficionado or road warrior, the entire setup is overkill for most practical purposes. Almost all digital devices these days that require charging come with the necessary cables and plugs, and spending cash on stuff you already have seems a little redundant. The main appeal of the pack is the collection of international adaptors, but the included plugs for every mobile in existence is less of a draw once you realise that only one of them is going to see regular use.

Otherwise, the adaptor is solidly built and radiates quality. APC is renowned for its UPS products, and it shows in the TravelPower adaptor kit. One niggle however is the way the voltage needs to be changed using a coin, screwdriver or other thin implement. This cumbersome way of adjusting the voltage significantly detracts from its ease of use.

The other part of this offering is the blue APC backpack. Tough, waterproof and durable, it's pretty much everything you'd want in a portable container.

While nifty, it is pure overkill – the Backpack is for the hardcore traveller only. Yet you could do better by shopping around. LB

SCORE 7/10

Altec Lansing MX5021

Supplier:
Audion
www.audion-mm.com

Website:
Audion
www.audion-mm.com

Phone:
Audion
1300 300 364

Price:
$349.95

Specifications:

103dB sound pressure level; 20W speakers w/ 3-inch full-range drivers; 6.5-inch 50W subwoofer; 90 RMS total; includes remote control.

It's hard to appreciate good speakers if you've never owned a set, or the set you do own is of the dinky multimedia variety that barely qualifies as an electronic device, let alone a product you'd pay money for. If you happen to fall into one of these groups, then Altec Lansing's MX5021 speaker-set is a great place to start, if you want an impression of just how good 'good' can be.

Apart from the two 40W thin profile speakers and an impressive 50W sub, the MX5021 resembles your average 2.1 setup. The sleek, wood-encased 6.5-inch woofer is massive for this type of speaker combination and each has what Altec Lansing describes as a 'piano-quality' finish, otherwise known as 'glossy black plastic'.

It must be noted that although the finish and design of the speakers are somewhat funky, they do feel a little cheap, and because of their thin profile they never quite sit 'flat'. Sturdier bases would have been a plus.

The package itself comes with all necessary cabling, including stripped speaker wires and a control unit. As with other speaker-sets, if you lose the control unit, you'll have no way of adjusting the bass, treble or volume other than through software so it's important to keep it safe.

In addition, there's a basic, functional IR remote that works rather well thanks to its refreshing lack of superfluousness.

Audio clarity is where the MX5021 shines. Bass tones, while not exactly warm, are distinct and impressive. The speakers are by far the best we've heard in a 2.1 unit, and require minimal amounts of fluffing around to position. Regardless of the output – music, games or the calming metallic twang of softcore porn – the speakers and sub can handle most sound sources admirably, although there was some slight distortion with high frequencies.

Altec Lansing's MX5021 is god's gift to the mid-range 2.1 audiophile, with its clear tones and thumping sub. The only let down is the $350 price tag, but otherwise, you can't get much better. LB

SCORE 8.5/10

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Games

Evil residents

Logan Booker contemplates the future of survival horror between brain snacks and aimless shuffling.

The first time I saw Resident Evil on PlayStation, I wanted to have Shinji Mikami's babies.

While biologically unfeasible, and probably illegal, it would have in a small way expressed just how grateful I was that he existed, and that Capcom was willing to breathe new life into the genre Infogrames birthed with the original Alone in the Dark.

Edward Carnby sticks in my mind as the gaming's ultimate incidental protagonist. Carnby was separated from the gamer by more than just software-powered polygons and a centimetre thickness of phosphor-coated glass. Carnby existed in a world devoid of help, a world that promoted non-interaction with NPCs but glorified energetic participation with one's surroundings. He struggled against unseen horrors with no concept of a health bar or ridiculous ammo count. It was just you, him and a horde of triangular-shaped beasts lurking in the pre-rendered environment of Jeremy Hartwood's Louisiana mansion.

Admittedly, Carnby often took sips from a hip flask during his adventures, so it's quite possible that the poor fellow was a crazed alcoholic who in reality spent his time running around said mansion with his pants on his head, urinating on those antique armours and blasting 18th century paintings with his trusty pistol, and there was nothing at all hiding in the shadows, except a few shallow pools of yellow nastiness.

Regardless, it was classic gaming.

In some ways, the cinematic experience of Alone in the Dark has been duplicated in recent titles like Doom 3, where the darkness is so permeable it seeps into pores and pants alike. The only escape of course is a horribly inefficient flashlight, much like that found in Alone in the Dark 4, possibly the worse game ever created.

Okay, not the worst game. But it was pretty damnable.

For a number of years, all gamers had were nostalgic memories of their Alone in the Dark experience, a game series that ended with a passable third installment (the fourth came much later) based in the wild wild west where six shooters ruled the world and spurs were all the rage. We were all expecting – nay, desperate for – another 'survival horror' title without even realising it, and it was only with the release of Resident Evil that it dawned on the gaming community that a gap had developed in the market, right under our noses.

Many people don't like Resident Evil, and understandably so. The opening cinematic is cheesy, the tank-like manoeuvering of the player-character cumbersome, and the dialog, even at its best, is sexually awkward – anyone who remembers Barry's 'Jill sandwich' line will instantly understand this sentiment.

Unfortunately for those of us who love the genre, it's careered downhill over the past decade like a vigilante wagon wheel attached to a renegade Saturn V solid rocket booster. First it was Dino Crisis, then RE: Nemesis, followed by The Thing... the list goes on.

Recently, Resident Evil: Outbreak fled from the creative mandibles of Capcom and made its way to Europe. Ignoring the fact the game has been available in Japan and the US for just over a year, Outbreak heralded the single feature every gamer has demanded since the original RE appeared: multiplayer.

Lo and behold, this feature has been stripped from the PAL version of the game, rendering it a hollow, crusty shell of its former self. 'Oh god, WHY??' is all I could say. Without question, online gaming is where it's at. How can you promote the future if you don't include it in your titles? Fair enough if it's not there to start with, but intentionally taking it out because you can? It's madness. It's classic catch-22, and until someone takes a leap of faith, there is no future for survival horror.

Arguably, multiplayer is *not* where it's at for survival horror, since at its core, the genre is powered by the mechanics of the single player experience: it magnifies the feeling of being alone with limited resources and enforces the fact that your arse is zombie fodder if you stop thinking for even a moment.

I love the genre enough to keep buying the games – but on the flipside, I refuse to buy crap games.

Your game sucks

Computer games have security flaws too. Logan Booker tells you which ones to look out for.

The last few years have seen game developers garner a reputation for being sloppy when it comes to securing their software, so much so that the likes of Microsoft pale in comparison.

If you thought cheating was bad, just wait until your bandwidth is being flooded by packets or your computer crashes remotely while you blast away at friends in the latest first person shooter. Many independent firms and researchers have found fundamental flaws in server and client code in many popular games including Half-Life, Unreal and Quake 3, as well as Gamespy's 'Gamespy Arcade' software.

Although such flaws have existed in games software for years, it was only after reports of Gamespy's complacent security in its Gamespy Arcade software that the gaming community at large was made aware of the problem, back in January of 2003. The flaw not only affected the program itself, but also a number of titles that made use of the service, including Quake, Battlefield 1942, Unreal Tournament and Neverwinter Nights – basically any game that featured the Gamespy server browser.

Discovered by private security firm PivX Networks, the flaw was exploitable using a specially crafted UDP (User Datagram Protocol) packet that would allow an attacker to force a game server to send hundreds of packets to any client running one of the affected games, effectively performing a denial-of-service. The exploit also had the ability to ignore firewalls, yet even this was not the most unbelievable aspect of the problem: Gamespy had been aware of the bug for some time, but had failed to take action.

Since finding this flaw, PivX has found security problems in other titles, including Valve's popular Half-Life. In fact, PivX found three potentially serious flaws in Half-Life involving the now infamous buffer overflow. It took Valve an extraordinarily long period of time to patch these overflows – after 100 days of inaction on the part of Valve, PixV released its own patch.

This has been the way for many uncovered flaws – game developers have either ignored or taken their time to attend to the bugs. When Epic was made aware of a serious problem in its Unreal Tournament series of games last year, it did nothing for six months. The problem affected not only Epic's Unreal titles, but also any game based on the engine technology including Deus Ex, Postal 2 and Devastation. This year alone has seen the discovery of a number of other flaws in Epic's Unreal engine, including a UMOD bug that allowed malicious users to manipulate any file on a system, in addition to executing programs; a bug that allowed a user to crash a server remotely and a bug that would force a server to perform a denial-of-service attack on its clients. Luigi Auriemma, an independent researcher who once worked at PivX, is responsible for finding a majority of these exploits.

July this year saw a flaw found in 2015's Medal of Honor that made it possible for a remote user to crash a server. And, as recently as October, bugs have been found in Master of Orion III and id's Doom 3.

The important lesson to be learnt is that users should remember to keep both their operating systems and their games up-to-date.

Developer Quote of the Month

'Woohoo. Wish the keyboard was of the backlit variety. I need to reinforce the screen mounts, too. But yum.'

Justin Frankel, Winamp main man and the only developer to regularly update his .plan, discussing his latest case mod.

ShortCircuits

- Seems Hugh Hefner fans will have to wait until 2005 to enjoy his amorous shenanigans. Publisher Ubisoft has confirmed that the release of Playboy: The Mansion has been pushed back to the first quarter of next year. Not that it's a big deal considering the OFLC craziness of late – the game will be lucky if it gets past the board without a Refused Classification.

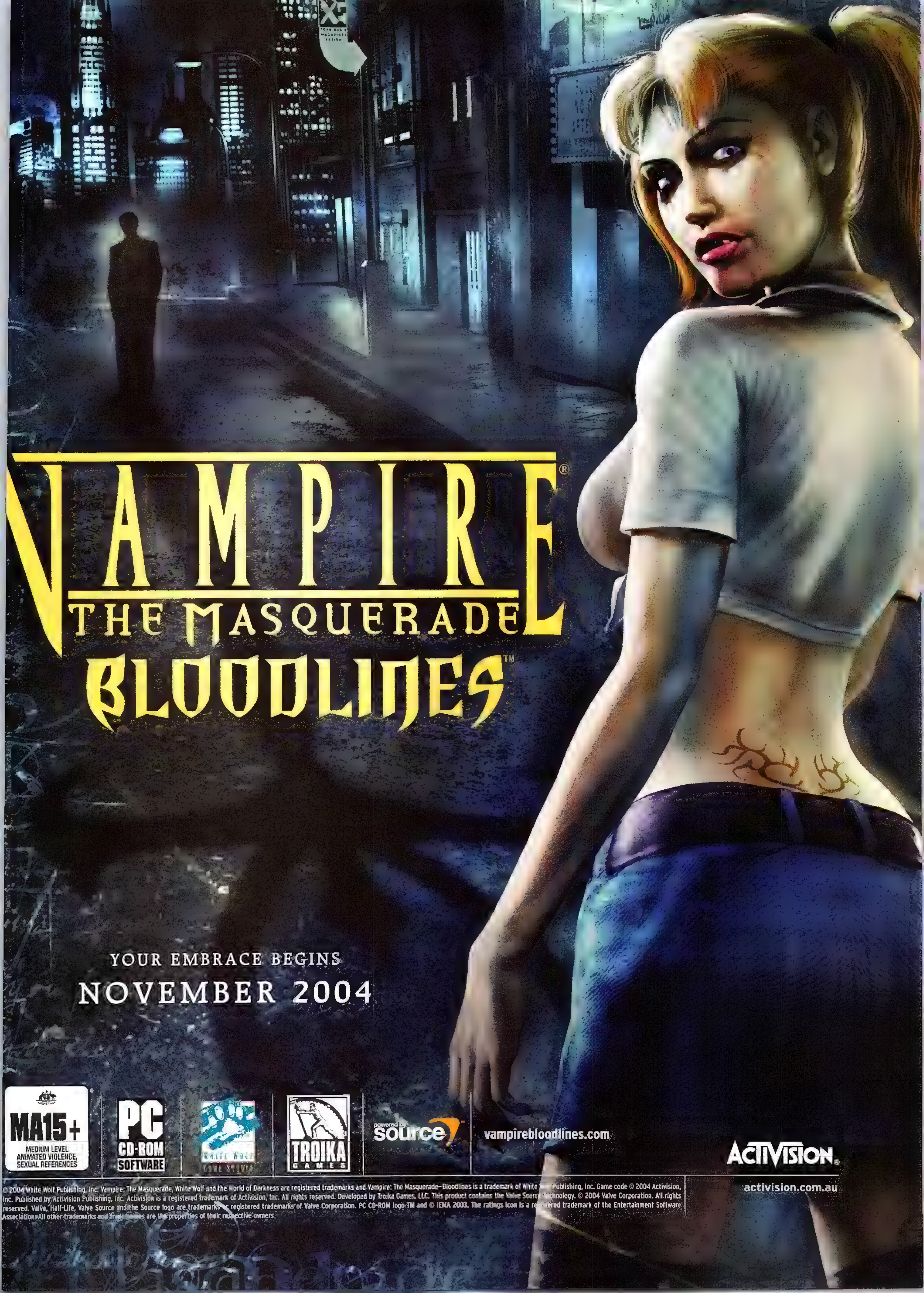
- Staying with Ubisoft, the publisher recently announced that its Montpellier studio, responsible for Beyond Good and Evil and Rayman, will be developing the King Kong game in conjunction with Peter Jackson's remake. Montpellier studio, based in France, is also behind the technology that powers Prince of Persia, called Jade. Watch this space – we'll be covering Jade in the coming months.

- System Shock fans will have already heard the good news that Irrational, the Australian and Boston based developer behind this imitable title, has announced its next project: Bioshock. Although Bioshock will be in no way related with Irrational's previous work, the available concept shots have an undeniable System Shock flavour. Again, *Atomic* will be sure to bring you the latest on this opus-in-the-making in upcoming issues.

BUZZWORDIKAN

User Datagram Protocol (UDP)

A 'connectionless' protocol found within the TCP/IP stack, used internet communication. Unlike TCP, it does not require a 'handshake' between client and server for transmission to begin, making it ideal for fast-paced applications.



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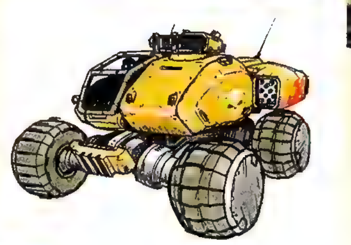
back with a
vengeance

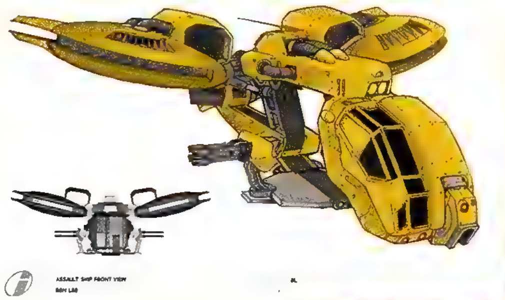
Logan Booker talks to Irrational Games' Tony Oakden and Rowan Wyborn on their Unreal-powered Tribes: Vengeance.

Many gamers fondly remember Dynamix – the Sierra-owned development studio that gave birth to the Starsiege universe. Starsiege, a Mechwarrior clone, was released in 1998 when the sub-genre of big robot FPS was at its peak – Mechwarrior 2: Mercenaries, brought out in 1997, hadn't been on the market long, and people were still enjoying the original Mechwarrior 2. Unfortunately for Dynamix, Starsiege couldn't overcome the beast-like Mechwarrior franchise.

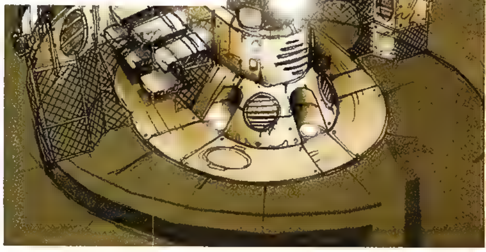
Ironically, Dynamix was responsible for developing the first Mechwarrior title, and previously enjoyed a lot of success with its isometric tactical Cyberstorm series, which was also Starsiege-based. While Starsiege faded into the background, Mechwarrior went on to spawn three sequels and a number of expansions during its six-year run. During this time the licence changed



ABOVE: Concept sketches for the jeep which appears in single and multiplayer.



ABOVE: The assault ship is great for carrying troops.



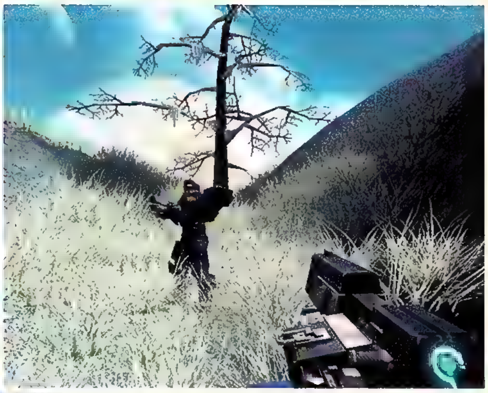
RIGHT: More concept art, this time of a tribal base. It closely matches those that players will find in the game.

hands with FASA and then MicroProse until finally, in 2001, Mechwarrior made its home with Microsoft, where it remains to this day.

Starsiege revisited

Starsiege however still had some life left in it and, during 1998, the folks at Dynamix released a first person shooter with the name Starsiege: Tribes. Tribes literally came out of nowhere – it featured team-orientated gameplay that eclipsed competing titles; revolutionary network code that allowed for massive multiplayer games over paltry 28.8Kb/s connections and large, seamless outdoor/indoor environments. Games such as Quake TeamFortress and Capture the Flag paled in comparison. The sequel, released in 2001, was just as good and expanded on the concepts that made the original a standout title.

While the Tribes engine was home-brewed at Dynamix, Tribes 2 was an implementation of independent publisher/developer GarageGames' Torque technology (covered in Engine Room, *Issue 43*). The success of these two titles however wasn't enough to satisfy Sierra and, shortly after the release of Tribes 2, Dynamix closed its doors. Although Sierra retained the licence, the future of the series remained clouded. That was until news came that the Australian branch of Irrational Games would be developing the next title, Tribes: Vengeance, using Epic's Unreal engine.



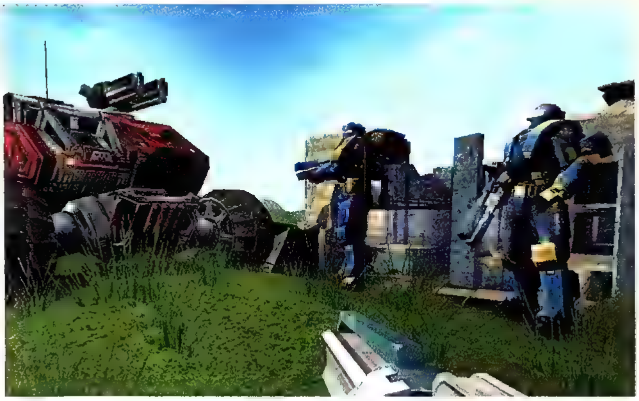
ABOVE: The extra work Irrational has put into the graphics pipeline does not go unnoticed. The Unreal engine still goes the distance.

Eat my disc-launcher

Although the gameplay of Tribes was a big draw card, for some, the huge back story and fiction were even bigger. Timelines compiled by fans of the series show the game's history spanning 1900 years. This period of time is split into ages including 'The Devastation', 'The Age of Decay', 'The Age of Hope', 'The Age of Isolation', 'The Cyberstorm', and 'The Splintering'. It is in the age of The Splintering that Vengeance is set, and the game tells the story of a group of religious separatists who have been decimated by a special order of knights known as the 'Blood Eagles'. The decimation causes the separatists to further divide, hence 'The Splintering'.

'Irrational was approached by Sierra in 2002 [to create the game],' says Tony Oakden, producer on Tribes: Vengeance. 'Sierra wanted to develop a new game which would complement the existing multiplayer [Tribes] games with a strong story-driven single player campaign. They were interested in working with Irrational because we had shown with our previous titles (System Shock 2 and Freedom Force) that we were capable of doing what they wanted.'

Vengeance was in production for two and a half years. However, according to Oakden, the first six months were dedicated to getting a prototype up and running. By the end of this time, the game had



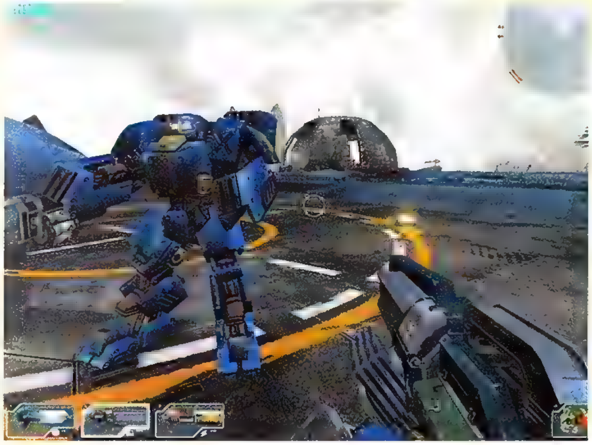
ABOVE: Many of the weapons in Vengeance have a legacy from previous titles, such as the chaingun shown here.

two working single player levels and a number of cut scenes. The prototype also served a number of other purposes, the biggest of these being that Oakden and his team wanted to prove that they could build a beautiful, expansive game using the Unreal engine.

'The team was mostly made up of ex-Freedom Force team members. No one on the team [apart from Jonathan Chey, who worked as project manager on System Shock 2] had direct industry experience working on a full price standalone FPS. Some of the team had worked on FPS [modifications] before,' says Oakden

Additionally, the prototype allowed Irrational to experiment with ideas for the single player component – a first for a Tribes game.

'The principle reason for including SP [single player] in the game was to encourage players who would not normally buy an MP [multiplayer] only game to purchase the product [and] we hoped that once they had finished with the SP game they would go online to find out what the MP experience was like,' explains Oakden.



ABOVE: Vengeance introduces a very palatable 'mecha' feel to the Tribes universe. Shown here is the heavy armour.

Realising this, Irrational knew it would be important that Vengeance had a focused, impressive multiplayer component – to draw in players with a propensity for single player, but also to live up to the exacting standards of its passionate fan base.

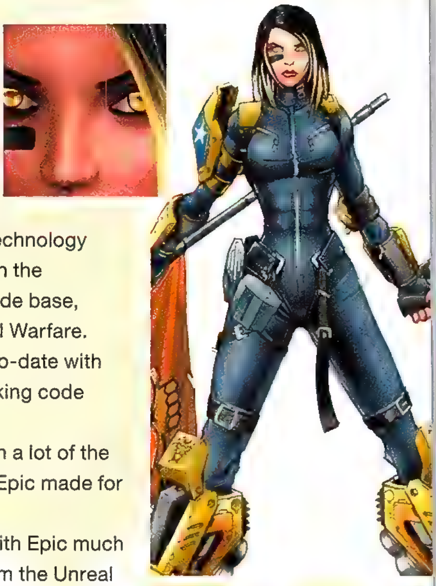
'There is little point in producing a great SP game if the MP game was poor as people would not continue to play,' says Oakden.

'Conversely though, if the SP game was poor we would not attract new players. I think we struck a reasonably good balance. To successfully achieve this balance on our budget meant that we had to share many assets between the two versions.'

Shazbot!

According to Rowan Wyborn, the lead programmer on Vengeance, it was Unreal's mature code base that won Irrational over; although the company did investigate a number of technologies before settling on Epic's offering.

'[Unreal had] tools that would allow us to start experimenting with game play and developing levels and assets from day one,' says Wyborn.



RIGHT: Princess Julia, a character from the single player component of the game. There's a reason for the yellow eyes...

Specifically, the engine technology in Vengeance has its roots in the Unreal Tournament 2003 code base, sometimes known as Unreal Warfare. Irrational however kept up-to-date with the latest developments, taking code when needed.

'For example, we pulled in a lot of the netcode optimisations that Epic made for UT2004,' says Wyborn.

'We didn't deal directly with Epic much – most of our help came from the Unreal Developers Network. However, on the few occasions where we had something urgent to sort out, the Epic guys were quick to respond and very helpful.'

Of course, Irrational did quite a bit of work of its own.

'We made significant changes to the code base, including completely new player physics, AI [Artificial Intelligence] and path finding systems. The renderer was also given a significant overhaul, with support for 2.0 pixel shaders and a number of high end effects. Finally the Karma physics system was ripped out and replaced with Havok.'

Pixel shaders weren't the only graphical improvements the team made to the engine. Over the course of its development, Vengeance would see both dynamic and light-mapped bump-mapping, full-screen high dynamic range glow effects and terrain light-mapping added to its repertoire.

'The AI system for [the single player component] is also a big chunk of work, and is very different to the Unreal bot AI,' says Wyborn.

'Once we got used to the code base, it was relatively painless to add to and extend.'

But not everything was painless. One planned feature was volumetric shadows, like that found in Deus Ex 2 and Doom 3. Unfortunately for Vengeance, it wasn't meant to be.

'Early on we had a rough system in place, however it soon became apparent that we would have to sacrifice a lot of object detail to get adequate performance in Tribes style levels, so the decision was made to scrap it,' says Wyborn.

It's tribal

Today, Tribes: Vengeance is complete, and the series continues to live on. Irrational has another game to add to its glowing portfolio, which already includes System Shock 2 and Freedom Force.

Currently, Irrational is working on the next SWAT game, called Urban Justice, which according to Oakden, makes use of the Unreal engine technology it developed for Tribes.

Recently, the company announced Bioshock, a spooky sci-fi title that looks like it will share some heritage with System Shock 2 – even if the two games are set in different universes.

Irrational has already let slip that Bioshock will make use of the Unreal engine, and there's no question that the experience Irrational has gained from working on Vengeance will assure its next title is just as good, if not better, than anything it has developed before.

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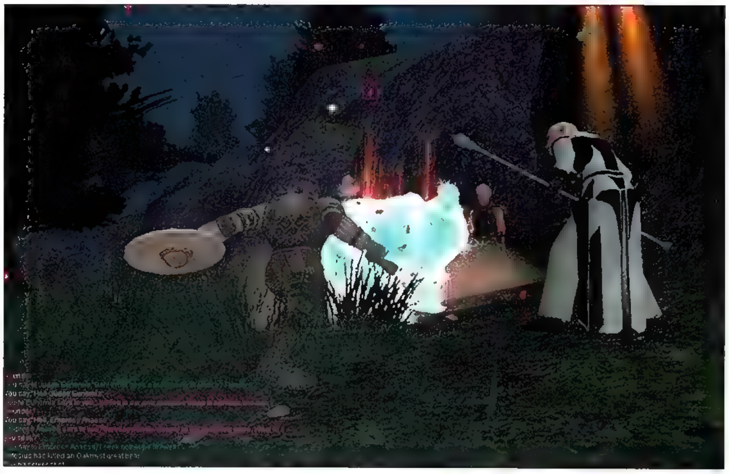
Although not the first MMOG, EverQuest was the one to well and truly establish the genre in the annals of gaming history. So much so, in fact, that EverQuest became known as Evercrack because it was unto the gamer as amateur videos of Paris Hilton are to the internet. Five years after release, this original e-smack is still played today.

But that'll change soon with the release of EverQuest II.

Set 500 years after Everquest, EQII is a world in turmoil – the moon Luclin has been mysteriously shattered, showering meteorites down onto the world of Norrath, destroying all but two great cities – the good port Qeynos and evil harbour of Freeport. And it is this backstory that finds all new characters as refugees starting on the newbie Isle of Refuge. Here players get to learn the ropes before choosing which city they will pledge allegiance to, and with it their initial alignment to good or evil.

Hardcore fans may find this disappointing – a marvel of EQ was in slowly exploring outside the racial boundaries of your start city. To make up for this the cities of Qeynos and Freeport are divided into 'neighbourhoods' for each race. Ogres and Trolls will find themselves in the squalid habit to which they're accustomed, while Gnomes and Halflings can frolic in the rolling hills of they Baubleshire. Speaking of which, all new players are given a residence, which somewhat insidiously requires an upkeep of rent, where they can retire after a hard day's adventuring. You can even buy furniture to decorate your cosy abode.

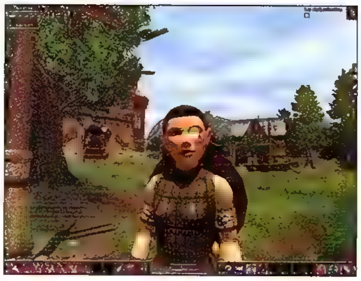
All up there are 16 races and 24 classes to choose from, and the class system is much evolved over its predecessor – initially players can only choose between Fighter, Priest, Mage, and Scout classes, but each of these branches into two speciality classes which in turn split again. A Scout, for example, can follow the path of a Bard, Rogue, or Predator.



ABOVE: A bear is frozen as it succumbs to a party of adventurers. Form of an ice minora!

However, this system is also restrictive. While you can choose the path your character follows, the skills, abilities and spells are set for each class as you level. Effectively, this means all characters of a particular type are identical. During the beta testing phase this lack of diversity caused a small uproar among beta testers, to which SoE responded with a series of new features designed to add diversity – Racial Traits, Traditions, and Tactics that allow players to choose features unique to their particular play style.

Another significant change is how death is handled. When you die you now keep all your equipment and do not directly lose experience, however you incur a significant experience debt which is largely offset by recovering your 'spirit shard', ie body. So while not necessary to recover your former self, it's in your interests to recover it unless you want to spend many hours paying off the experience debt.

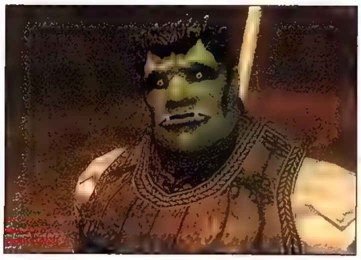


ABOVE: The lush greenery of The Baubleshire makes every Gnome feel at home.

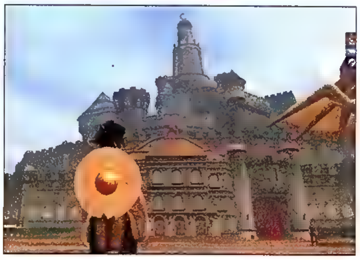
As you'd expect the graphics are ahead of the curve, with an all-new engine taking advantage of pixel and vertex shaders to deliver beautiful scenery the likes of which will yet again set a benchmark just as EverQuest did. If you get bored of the hack-and-slash levelling, you can always just sit and watch the beauty of the broken moon Luclin rise in the midnight sky. It comes at a cost, of course – you'll need a 6800 Ultra or X800 XT to be able to run on the highest settings with any semblance of framerate.

If you're a fan of the original you'll love EQII, but be prepared for some significant changes. If you're new to EQ, set the timed alarms built into the interface – yes, they really added this – lest your friends and family never see you again. Look out for a full review next month.

PREVIEW



ABOVE: Oggo the Ogre Shaman, one of many alter-egos!



ABOVE: The towering castle at the heart of Qeynos.

World of Warcraft

John Gillooly discovers this game is not just WoW by name, it's wow by nature.

PC

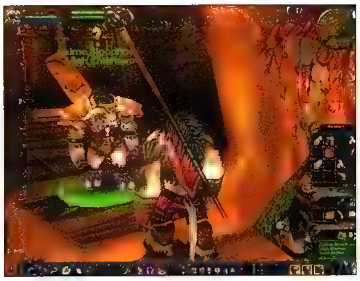
Specs

Developer:
Blizzard Entertainment
www.blizzard.com

Publisher:
Vivendi Universal Games
www.vug.com

Distributor:
Vivendi Universal Games
www.vug.com

Phone:
Vivendi Universal Games
(02) 9978 7722



ABOVE: Characters from Warcraft 3 return, in this case the Tauren hero of the game.

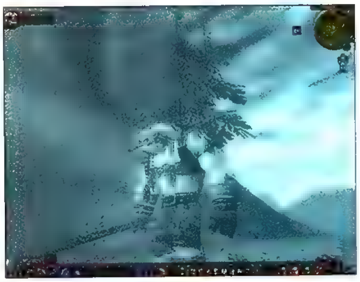
We have no idea what they put in the water at Blizzard but by god it makes for good gaming. Already one of the finest game developers in existence, Blizzard is close to releasing its Massively Multiplayer opus World of Warcraft.

Based upon the long running RTS series, this MMOG flows on from the storyline of Warcraft 3. In that game Blizzard introduced new races, new game concepts like creeping and a new graphics engine. All of this has flown through into WoW, even the graphics engine is the same.

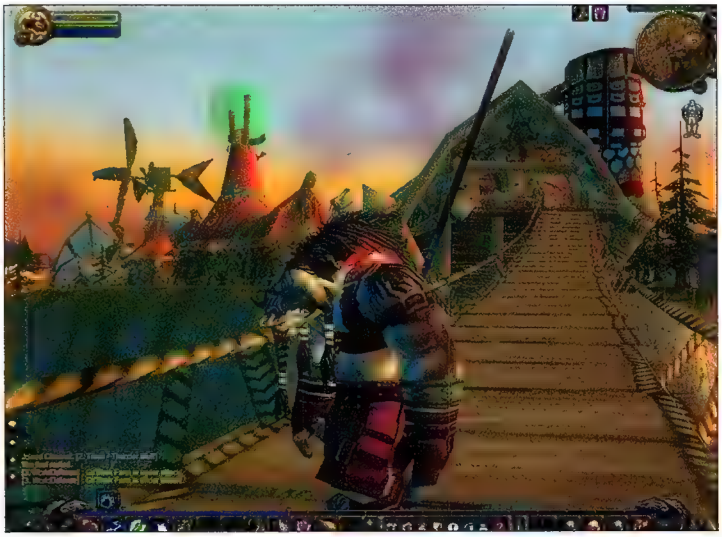
As you play it the importance of Warcraft 3 becomes clear. Blizzard has managed to make you feel like you are one of the units from Warcraft 3, while still retaining the sense of individuality necessary to provide the hook that keeps one playing a game for months on end.

You begin the game by choosing a race. There are eight in total, split between the two factions in the game – Horde and Alliance. The Horde is comprised of Orcs, Undead, Trolls and Tauren while the Alliance has Humans, Dwarves, Gnomes and Night Elves to choose from.

There are various restrictions on what classes each race can play, and these approximate to the abilities seen in Warcraft 3. There are also trade skills like skinning and enchanting to be learned as you progress through the game.



ABOVE: Death in the game sends you to this spirit world, where you venture to recover your body.



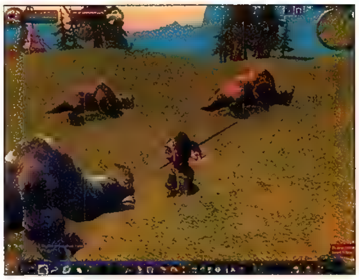
ABOVE: The immaculate environments capture the feel of the Warcraft universe brilliantly.

Once in the game the influence of Blizzard's other iconic franchise, Diablo, becomes apparent. The levelling and talent system smacks of that title and the development team has learned a lot from the superb handling of items in Diablo II. This is intrinsically important as the item system means even early on you feel like you are uniquely equipped.

In terms of gameplay WoW follows fairly traditional lines. A lot of the early game is spent wandering the wilderness killing small animals and collecting things. Every now and then you will come across a small gathering of higher level creatures, much like the 'creep' encampments in Warcraft 3. These usually hide a chest full of booty for those wanting some action.

Larger quests and guild raids also come into the game, and there is an extensive guild system. In order to interact with other characters you will sometimes need to learn their language, and this adds to the depth of the role playing experience.

Graphically the game is stunning, with the same saturated cartoonish look of the RTS. It is stylish and low polygon but it works magnificently. Your character can be customised at the start and then each item you equip has its own unique look to it.



ABOVE: The environments in the game teem with life, both hostile and benign.

The game is enjoyable experience to get into and get hooked on. Early missions are well paced and there is always a number on offer for both individuals and groups, while later raids promise to be huge.

There was a lot of debate during the beta phases about how Australia would fit into the worldwide rollout of the game. The decision has now been made to locate Aussies on the US servers rather than the Korean ones. We played the beta on both of the US test servers and despite a latency of around 290ms it was eminently playable and lag free.

World of Warcraft looks set to take it to the incumbent online franchise, Everquest, when it launches. After over a year of polishing, Blizzard's opus is ready for prime time and not since Diablo have we come across a game with more potential to suck the spare time of both newbies and veteran gamers alike.

Rome: Total War

Mei Sus scrufa est inflammo. David Kidd roasts some Roman pork.

PC

Specs

Developer:
The Creative Assembly
www.creative-assembly.com.au

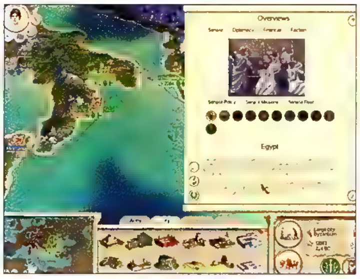
Publisher:
Activision
www.activision.com

Distributor:
Activision
www.activision.com

Phone:
Activision
(02) 9869 0955

☺ The richest and most detailed warfare simulation ever.

☹ A few bugs; AI needs some work.



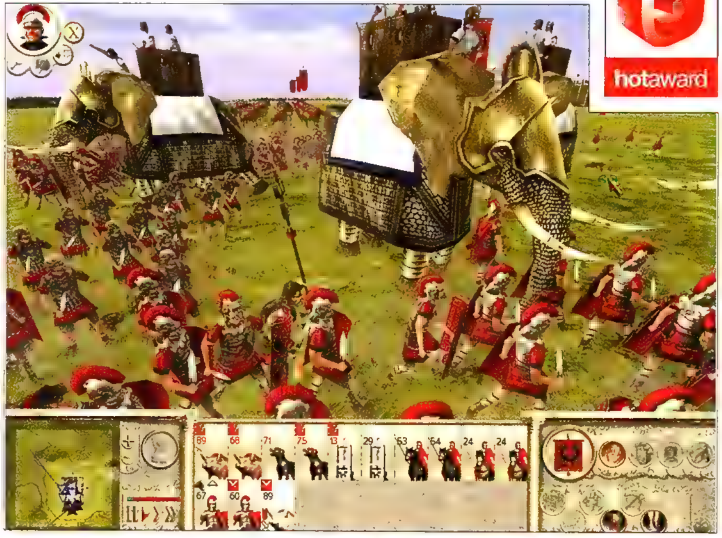
ABOVE: Sick of being the Senate's bitch? Take it over.

The original Total War games, Shogun and Medieval struck a chord with us in that they were brilliantly conceived and executed, but did not reach the heights that they could have. The cardboard cutout armies – an unfortunate compromise in displaying vast amounts of units on less than adequate hardware – were distractingly poor, but the underlying game was strong enough to carry it through.

The realtime tactical component wasn't the only game, though – it was plugged into a fantastic Risk-like strategic campaign. Both game modes were good enough to be released as separate games, but when tied together they provided a thorough simulation of history's greatest campaigns and provided a personally historical context for each battle.

So now, we have our first classical era title in the series, and no period is more deserving of the Total War treatment than Rome. Fans of the series will know that The Creative Assembly did far more than just reskin Shogun's engine to fit into the Medieval scenario. Rather, the strategic and tactical games were drastically different, reflecting the units and strategies of the era. This tradition continues, and both the strategic component and tactical engine have all been updated to reflect the period.

Turning to the strategic game, the most obvious difference you'll notice is cosmetic – the entire map is rendered in 3D. The 2D maps of the previous titles were gorgeous, but the static map quickly became tedious through dry periods. R:TW's strategic map is alive with activity: trade boats are constantly sailing between ports, the roads teeming with traders, and any changes you make, like building a highway that cuts between towns, are immediately updated on the map.

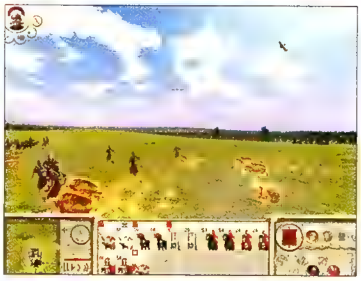


ABOVE: Dumbo's distant European relatives get violent.

The mechanics are essentially the same as previous games, where you build up settlements and cities, produce vast armies, engage in diplomacy, and ultimately conquer your neighbours. R:TW delivers its distinction with the main campaign putting you in control of one of three Roman factions as you enact orders from the Senate. Your ultimate goal, however, is to finally cut through the formidable SPQR and overthrow the Senate, before wiping out the competing warring factions and taking over the known world.

But it's the tactical game that shows the most improvement. For the first time, Total War is now represented in full 3D. Up close, the detail is great with hundreds of units carefully and accurately reconstructed. Zoom out, and you'll see thousands of units marching in synch, with a set of animations that reflect its use on the battlefield. Siege weapons are also prominent, with Onagers, ballistae, battering rams and towers playing a huge role in breaching city walls.

It's not all rosy, though. The cut scenes, which are rendered in the 3D engine, are dire and much of the voice acting makes you want to tear your ears off. The AI also suffers from idiocy every now and then, where your computer controlled allies will sometimes charge your finest General straight into the arms of waiting infantry, leaving you with little to do but watch his eventual demise.



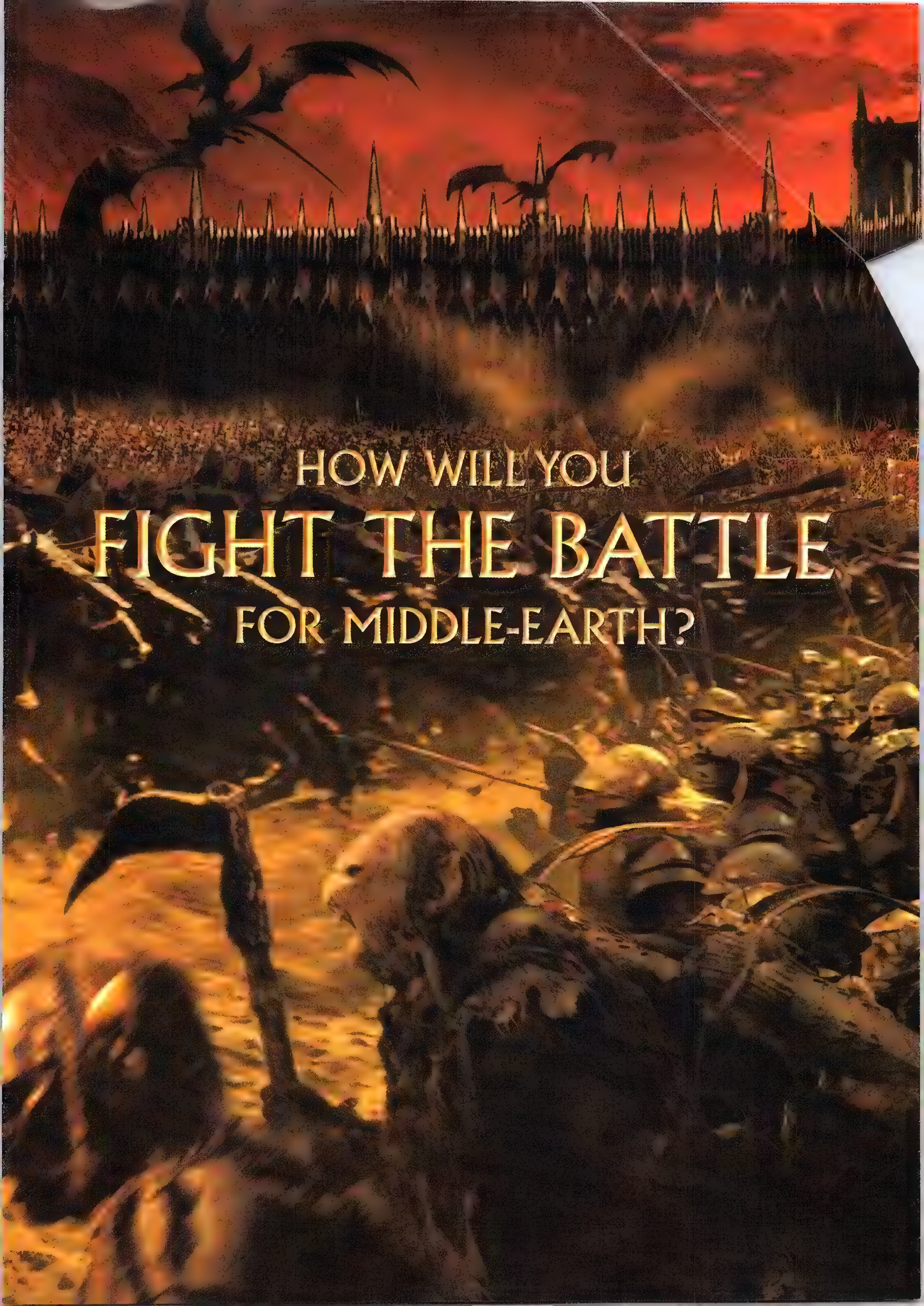
ABOVE: Elephants running amok? Set some pigs on fire and run away.

But those issues aside, this is *the* Total War opus. That it took so long before we finally got a fully 3D version is simply testament to how far ahead of its time the original games were. It's an encyclopedia of Roman history wrapped up in a beautiful tactical. If it weren't for some slight flaws, this would get a perfect score, but don't let that deter – it's but a patch away from greatness.

Requirements
64MB DirectX 9.0b graphics card; 1GHz CPU; 256MB RAM; 3GB HDD
Recommended
3GHz CPU; 1GB RAM; 128MB graphics card.

SCORE 9.5/**10**

hotaward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From the Studios of The Lord Of The Rings™ The Battle for Middle-earth™

The team that was responsible for Command & Conquer™ Generals, the award-winning real-time (RTS) strategy game and No.1 PC game of 2003 presents The Lord of the Rings™ The Battle for Middle-earth.™

Their goal was to make the best The Lord of the Rings™ the world has ever seen. The result is a real-time Middle-earth experience in stunning detail as never before. Creatures such as Orcs, Mumakil and Ents are rendered with unprecedented life-like quality, and are just as interactive as the heroes and locations made familiar to fans of The Lord of the Rings™ games. And if that wasn't already exciting, you have the chance to command both the forces of good and evil in all of Middle-earth's famous battles. As a result, The Battle of Middle-earth promises to be the biggest, most expansive, and most immersive The Lord of the Rings™ game experience ever.

Executive Producer and EALA Vice President Mark Skaggs had this to say about making the best The Lord of the Rings™ game ever a reality.

As game makers we tend to think heroes are the stars of a game, but when we asked the players themselves they said, "Heroes are cool, but what we are really interested in is living in the world of Middle-earth."

Beyond making sure we deliver a very cool world to play in, we were constantly measuring what we do against what feels real and accurate to the world. Even though we're moving beyond a pure RTS game, The Battle for Middle-earth still needs an overview map, so we adapted it to look like a hand drawn parchment map as a better fit into the world.

How did you go about giving The Battle for Middle-earth a sense of life that is atypical to a standard RTS game?

We are focusing on the actions and reactions a character has to their environment and the style in which they would do things like a troll's rage before he attacks a unit of Gondor soldiers, to the Ents or the Mumakil reacting violently to being attacked. The way in which a character acts is an important way to communicate life.

Are there any pitfalls you have to avoid in bringing a sense of life to the characters and the locales in The Battle for Middle-earth?

We avoid pitfalls by picking a target early on and deciding what we want to achieve and then making sure we don't sidetrack ourselves by trying to get too broad or too diverse. As a team we're lucky to be focused enough to avoid steps that would ultimately slow the processor down and then cause us grief later on.

We constantly remind ourselves of what matters to the player, and it's not what we're seeing the character doing but rather if it is understood by the players. We're all game makers and we sometimes fall into the trap of playing the game in our head. Sometimes we get it onscreen and discover we've been so focused on the details that players absolutely miss the points we're trying to make.

One of the exciting elements of The Battle for Middle-earth is the fact that players will finally have a chance to play the forces of evil. How will this be incorporated into the game?

We've attempted to make the game as authentic to the films and fiction of Middle-earth as possible. One of the facets of that is, when you are playing the good guys, you feel like at any moment you could lose. It's an incredible feeling of pressure, seeing hordes of enemies coming at you and realizing your forces are the only thing that can stop them. You win by a hair. In such a scenario, the opportunity to try things out as the bad guys is enticing. You might say, "If I were a bad guy and if I had hundreds of Orcs I would do this or that." That's what we want people to feel and ask questions like, could they have defended Isengard from the Ents by stationing trolls there? That's really the essence of why we say this is the best The Lord of the Rings™ game ever done.

What sorts of elements will The Battle for Middle-earth incorporate specifically to appeal to hardcore RTS players?

We've got some really cool features that address strategy issues and take RTS control of characters to a new level. For example, you have archers. Orcs come up with swords. You know that, at close range, the archers are going to get hacked up by the swordsmen. But at a distance the archers are clearly superior. So what happens if you combine archers and pikeman to make a multi-unit group? Now you have a group formed of different types of units that acts intelligently. This can create a whole bunch of cool, complex scenarios.

Any closing thoughts?

We want to win the hearts of RTS fans, but we also want to win the hearts of fans of the film. I think our approach is going to offer each of those players the best Middle-earth and The Lord of the Rings™ experience ever.

Warhammer 40K: Dawn of War

Logan Booker gets down and dirty for a little Gorka Morka.

PC
Specs

Developer:
Relic
www.relic.com

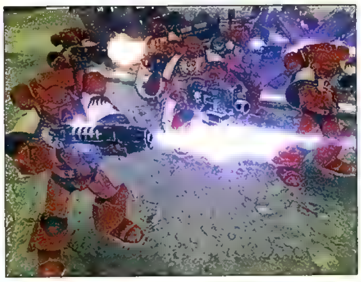
Publisher:
THQ
www.thq.com.au

Distributor:
THQ
www.thq.com.au

Phone:
THQ
(03) 9573 9200

☺ One of the best intro cinematics ever; squad-based troop management with both ability and weapon upgrades.

☹ Can be a little simplistic at times; can only play Space Marines in the single player campaign.



ABOVE: Whatever you do, don't cross the streams!

The conversion of Warhammer 40K into a *good* computer game has been the subject of every geek's wet dream for the past two decades – excluding those with Magic: The Gathering fetishes and Pokemon fanatics.

In-between model-painting parties and treatments for lead poisoning, a number of Warhammer titles have made their way to the market. Unfortunately, for players and publishers alike, these games stayed a little too true to the table-top formula, using turn-based engines and hex movement systems. It's a formula that, for video games at least, equates to zero fun.

Harnessing the power of its Impossible Creatures engine, Relic has seized the Warhammer license and developed Dawn of War, a realtime strategy that puts the player in the titanium boots of the Blood Ravens, an elite squad of Space Marines. Although this is the only side you get to play in the single player campaign, the other three races that make an appearance – the Eldar, Chaos and Orks – are available for multiplayer and skirmish.

Gameplay in DoW is reasonably standard, with the exception of squads. Instead of controlling individual troops, ground forces are produced in small teams that can be upgraded with abilities and superior weapons. Mobile platforms and 'heroes' can be attached, boosting their effectiveness, and each side receives a super-unit that is a force unto itself.

The resource system is much like that found in Total Annihilation – the player receives points from limitless supplies. While energy is produced by building generators, resource points can only be gained by capturing certain 'strategic points', and it is in these that the core gameplay mechanic of DoW lies: capture a number of points and you can defeat your opponent.

Although Warhammer 40K: Dawn of War doesn't bring too much to the genre, it's a massive jolt for the computer game-side of the Warhammer franchise.

Requirements
1.4GHz Pentium-class processor; 256MB RAM; 32MB T&L-capable video card.
Recommended
2.2GHz processor; 512MB RAM; 128MB video card.

SCORE 8.5/**10**

Ragnarok Online

Logan Booker explores the world of anime avatars, sans Pokemon and Chokobos.

PC
Specs

Developer:
Galaxy
www.gravity.co.kr

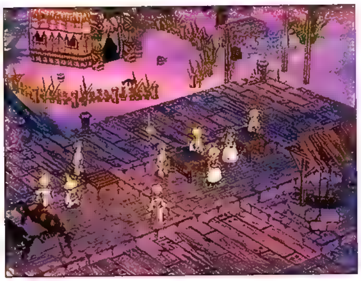
Publisher:
OnGameNet
www.ragnarok.com.au

Distributor:
OnGameNet
www.ragnarok.com.au

Phone:
OnGameNet
(02) 9804 0394

☺ Easy to get into; few requirements; lots of variety in skills and abilities; strong community focus.

☹ Translation needs a bit of work; early game is simply all about killing, killing and more killing.



ABOVE: Get violent with the little people in this popular MMORPG.

Ragnarok Online is a global phenomenon, sporting a subscriber base of 25 million spread over 130 countries, including the US, Germany, Brazil and China. Created almost five years ago by Korean developer Galaxy, Ragnarok is now one of the most popular MMORPGs in existence.

Until recently, Australian players were unable to enjoy the computer adaptation of the Lee-Myon Jin comic world of Ragnarok without a great deal of hassle. Luckily for Oceania, a local company called OnGameNet recently picked up the rights to run an official server in Oz, and since then we have been able to enjoy some RO in all its animated goodness.

RO has a strong community focus, founded on an arguably basic RPG system. What gives the system life is the crazy amount of items and skills, and the experience is more about co-operation than level-building.

Combat is very Diablo-esque – click on the bad guy, time the use of your abilities, and try not to die. But even if you do, Ragnarok is reasonably forgiving and you'll only lose a small amount of experience for kicking the bucket. For those interested in extra combat, there is a restricted area for player versus player fighting.

The game features a massive number of occupations, and is probably the title's highlight. Players start out as novices, and can then choose such base jobs as thief or acolyte after a short training session. After a crazy amount of leveling, even more jobs become available. Unfortunately, some of these jobs aren't accessible in Ragnarok Australia – although OnGameNet has promised that it will be introducing them sometime in November/December.

It should be noted that the translated dialog is not English-friendly, and will confuse players from time to time.

Ragnarok Online is a fun MMORPG. And, for the time being, it's also free while the Australian servers are tested. If it's let down by anything it's the missing content. If you can hold out until this is rectified, you'll find RO to be a rewarding experience.

Requirements
500MHz Pentium-class processor; 128MB RAM; 8MB DirectX8-compliant video card; internet connection.
Recommended
700MHz processor; 256MB RAM; 32MB T&L-capable card.

SCORE 8/**10**

Need for Speed Underground 2

Follow the white line says John Gillooly, it's a nice ride.

XBOX
Specs

Developer:
Electronic Arts
www.electronic-arts.com.au

Publisher:
Electronic Arts
www.electronic-arts.com.au

Distributor:
Electronic Arts
www.electronic-arts.com.au

Phone:
Electronic Arts
(02) 9264 8999

☺ High speed; good looking trip into the world of the sick.

☹ Races can get repetitive; music of variable quality.

ABOVE: Find yourself a wingman and feel a need for speed.

EA surprised everyone with the move of the Need for Speed franchise into the world of underground street racing last year, and now it has delivered the second instance of the game. A sequel that is bigger, brasher and more immersive than the fairly standard driving game structure of the original.

In a concept not dissimilar to that of the competing Midnight Club games, Need For Speed Underground 2 (NFSU 2) now takes place across one big city. You cruise the streets looking for races and dropping into shops to customise your car. These customisations feature the standard range of performance boosts like Nitro, Transmission and Tires, but far more extensive is the range of quality bling bling for your automotive pleasure.

For the cars in NFSU 2 are all about looks. You can customise more extensively than the original and soon your once boring and showroom-standard old Hummer (yes, the game now has SUVs) will be bedazzling with neon, contorting on its hydraulic suspension and pumping out fully sick beats from the custom stereo you installed in the boot.

By no means is the bling pointless though, for photo shoots are part of the core game. In these set ups you get to position your gleaming pride and joy, maybe pop the hood and reveal your engine neon and paintjob and then snap a shot for a DVD cover. To achieve these photo shoots you need a certain level of visual impressiveness, which only comes from customising the looks of your car.

The game is nicely paced, with rounds of sponsor challenges used to provide objectives. This works well as it ensures you will experience several different cars on your quest to own the underground and by the end of it all you will have a garage not dissimilar in looks to a case modding competition. Which is kinda cool.

NFSU 2 is a nice evolution from the original and provides that nearly unique need for speed driving feel with the ability to tap into that hidden accessorisation fetish that most of us have. An enjoyable spin in the city.

hotaward

SCORE 9/10

X-Men Legends

John Gillooly goes beserker with Logan's claws.

XBOX
Specs

Developer
Raven Software
www.ravensoft.com

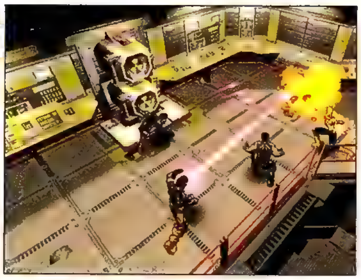
Publisher:
Activision
www.activision.com.au

Distributor:
Activision
www.activision.com.au

Phone:
Activision
(02) 9869 0955

☺ Fun X-Men action; co-op play; Wolverine's blades.

☹ Lacks that something special.



ABOVE: Lasers, mutants, Wolverine: perfect X-Men comic combo.

While calling this an RPG is drawing a long bow, X-Men Legends is a top down action game with role playing elements that let you take control of 15 of the mutant world's finest superheroes in a game that recreates some of those classic moments of the revered X-Men comic series.

You play a team of up to four X-Men, who are trying to stop an evil plot by Magneto and the brotherhood of mutants. Along the way you will come across Sentinels, Morlocks and others from X-Men history. The gameplay mainly centres around combat, both with normal soldiers and a regular smattering of bosses, and at heart is a kill and collect game.

Each of the X-Men in your team can be controlled, and the game also features drop in co-op multiplayer if a friend comes by. Controls are simple and mostly combat based, and the RPG aspect of the title comes from the gathering of experience, which can be used to enhance basic stats and unlock new mutant powers (which are easily accessible by holding down the right trigger).

These mutant powers are faithful to the comics. For example, Wolverine not only has a couple of claw specific attacks, he can also use his mutant healing factor and beserker rage. In fact, this game is much more true to the comics than the two movie renditions of recent years.

The game is a hoot to play, even if at times the art of dying seems a little too easy. Characters can later be resurrected but it is amazing how quickly one character's death will mean your team will soon follow.

With a combination of Cel shading and normal rendered backgrounds, X-Men Legends looks good. However, it is a little blurry for an Xbox title.

The standard of the voice-overs is really good, especially with the ever-dependable Patrick Stewart reprising his movie role as Professor X, and this amounts to what is a well rounded, if unspectacular game. It also enhances the element of authenticity to the whole thing.

All in all, it is fun, and most likely a must have for hardened X-Men fans, if only for the nostalgia aspect. Just be warned that those expecting an RPG will find this is much more of an action game than anything else.

SCORE 8/10

Tribes: Vengeance

Play alone or with others! David Kidd sticks his hands down his pants.

PC
Specs

Developer:
Irrational Games
www.irrationalgames.com

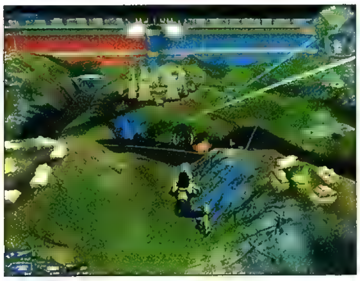
Publisher:
Sierra
www.sierra.com

Distributor:
Vivendi Universal
www.vugames.com.au

Phone:
Vivendi Universal
(02) 9978 7722

☺ Slick physics; spinfusin' mayhem; cool soundtrack.

☹ Too streamlined for old school Tribes players; no skirmish.



ABOVE: The confined single player arena is a training ground for the multiplayer game.

The original Tribes games kicked off the multiplayer genre that we're used to now, but unfortunately, the complex gameplay, steep learning curve and lack of a single-player mode meant the games didn't take off as well as they deserved. Irrational Game's solution to this series is to attract the masses and retain the Tribes crowd by staying true to the franchise and sticking to the core elements.

The result, for those that know Tribes, is less weapons, simpler gameplay, better graphics, and a single player campaign. If you don't know Tribes, think BF and UT with skis and jetpacks. The question that really needs answering, then, is why would someone not interested in Tribes defect from BF or UT, and why would a Tribes freak be interested in a sequel with the meat taken out?

The answer is, simply, that it works. Jetpacks and skiing are better than ever, and the new game modes, borrowed from UT, are great. The hardcore Tribes players will flinch at some of the casualties, though – the multiple grenade types and extensive base building options have been pared back, and the commander screens and troop transports are nowhere to be seen. That said, there are some new additions, like the grappling hook, which refresh the franchise and bring new strategies to the game.

We haven't talked about the single player campaign, which is really just a series of training levels. Its key selling point is the option to play through the eyes of several characters, but it's largely unremarkable – we would have preferred a solid skirmish option to hone our skills. However, it does serve to flesh out the rich game world which, until now, hasn't been capitalised on.

Ultimately, IG has delivered a game that should appeal to those outside the Tribes sphere, while still retaining the fans. But, like all multiplayer games, it will live or die on the servers, and currently the local situation isn't too hot. As such, here's hoping the mainstream community will embrace it.

hotaward

Requirements
32MB DirectX 9.0c graphics card; 1GHz CPU; 256MB RAM; 5GB HDD
Recommended
128MB DirectX 9.0c graphics card; 3GHz CPU; 1GB RAM.

SCORE 9/10

Tony Hawk's Underground 2: World Destruction Tour

THUG or Jackass? John Gillooly can't decide.

XBOX
Specs

Developer:
Neversoft
www.neversoft.com

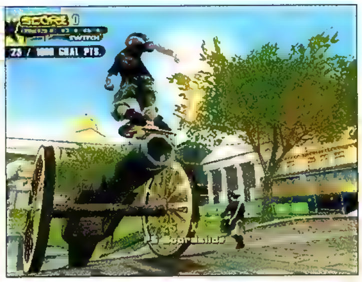
Publisher:
Activision
www.activision.com

Distributor:
Activision
www.activision.com

Phone:
Activision
(02) 9869 0955

☺ Classic mode returns; good, fun skating action.

☹ At heart it is more of the same.



ABOVE: The skateboarder replaced the cannonball as the first line in defence.

A near Christmas release of a new Tony Hawk game has become something of a ritual over the past six odd years. The latest instalment in the game series that now officially qualifies as venerable is Tony Hawk's Underground 2 (THUG 2), in which developer Neversoft has taken the tried and true skating formula, tweaked it, returned the much missed 2 minute objective mode and added a healthy dose of Jackass.

THUG 2 centres around a 'world destruction tour', a competition between two teams, one led by Tony Hawk and the other by Bam Margeura. While Bam has appeared in previous games this time he is accompanied by his cohorts from Jackass. This also means the game's focus is on wacky behaviour rather than simply on pure skating. Of course there is still loads of the combo making skating fun that made this series so great, but you also end up having to do things like control Steve-O, who is riding a wheeled mechanical bull.

Thankfully THUG 2 does improve on some shortcomings of the original. Non-skateboard transport is much better, with vehicles actually feeling like they are part of the game rather than something crudely bolted into the physics engine. The return of Classic mode, in which you have a series of objectives to attain in two minutes runs through a level, is a godsend and provides a welcome break from the at times ludicrous nature of the story mode.

Environments are now huge, something made even more apparent by the return of the first Warehouse level from Tony Hawk's Pro Skater. New levels completely dwarf this, and environments will also alter after certain goals are completed. For example in the Boston level you can set your board on fire and use it to fire two cannons at a construction site, which in turns collapses into a quite handy little skatepark.

It still has a mild reek of same shit, different smell, but after so long this is something that is to be expected. Quite simply, it is indeed a better game than THUG 2. Nonetheless it doesn't have the same magical feel that the franchise once had. Neversoft's Tony Hawk games are still the kings of the extreme sports titles, but they are not the instant classics that they used to be.

SCORE 8.5/10

The best selling WWII shooter returns to take you deep into the Pacific Theatre of Operations. You won't be alone as you fight from the smouldering Battleship Row in Pearl Harbour to the deadly beaches of Tarawa Island; real-time dynamic A.I. means your squad has your back. Benchmark-shattering technology, a brand new game engine, and Havok™ physics bring your hell in the Pacific to life in graphic detail. Join the MOH Army. Enlist at www.moh.com.au.

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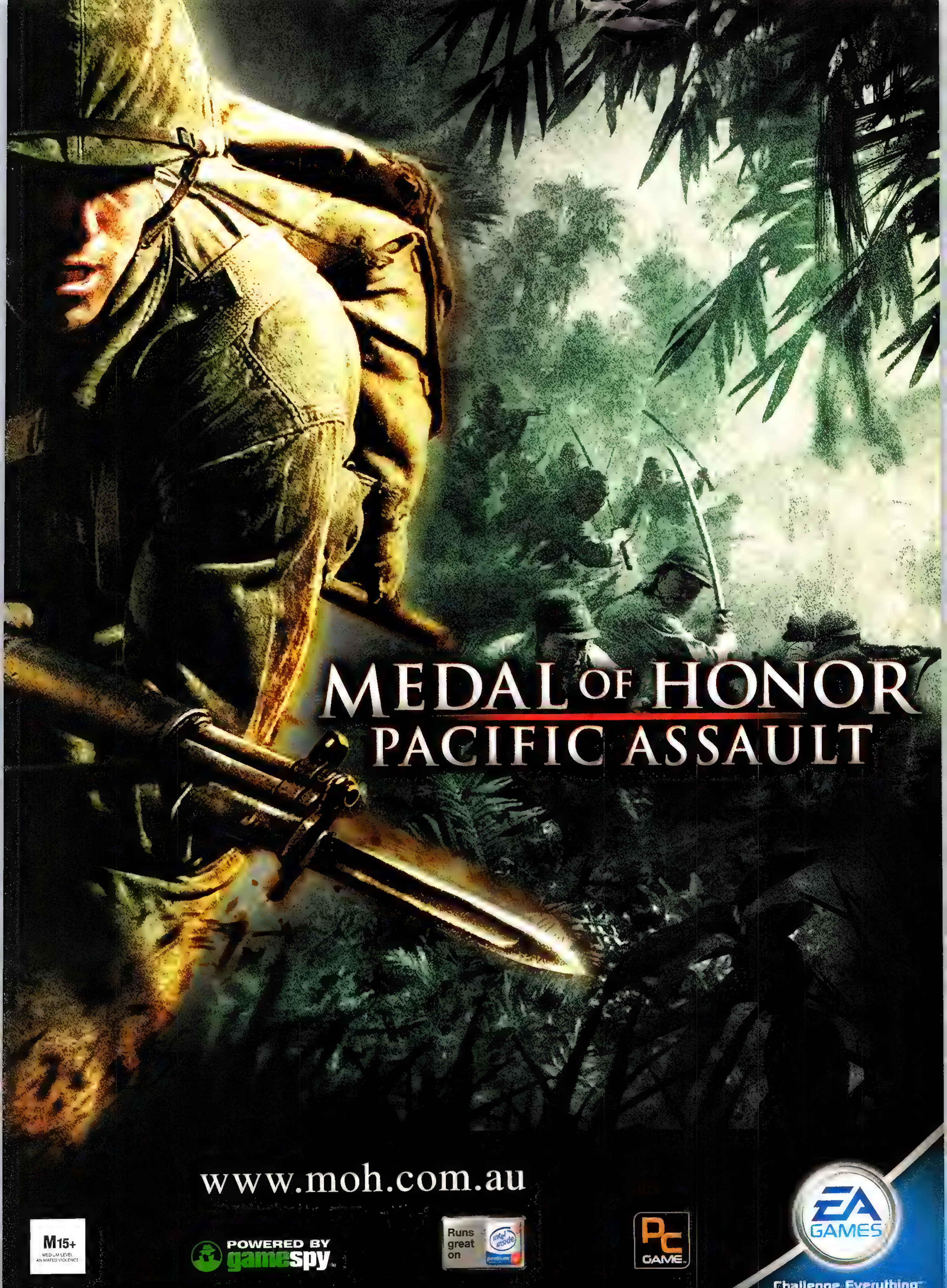

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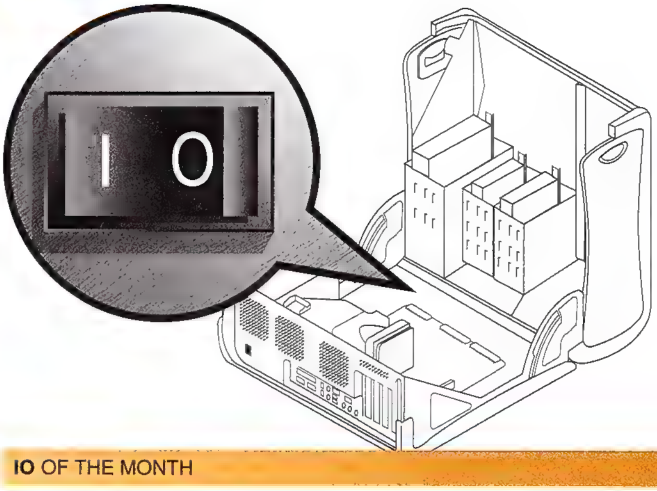


IO of the month wins a Logitech MX510!

Like a chocolate milkshake only crunchy!
io@atomicmpc.com.au

IO OF THE MONTH

Volt variation

I I've got a family member heading off to the US and would love them to buy me a video projector while they're over there. I know that most projectors support PAL and NTSC, but what I'm curious about is the power. I know you can buy a simple adaptor plug here to limit our power to match theirs, but what if the projector already has a built-in power amplifier? If this existed, would it simply be a case of being able to remove it?

Tom McGruther

O Cheap adaptor plugs just let you plug some other country's mains plugs into our sockets; they don't do anything to the voltage. For them to work, the device at the other end of the cord has to be cool with Australia's 220V, 50Hz mains power. If an appliance wants, say, US power (60Hz, which seldom matters, but 110V, which really really *does* matter), then Australian mains will probably cause it to respond with the tried and true 'blowing up' strategy.

A lot of gadgets these days, PCs included, have power supplies that automatically adapt to pretty much every mains supply in the world – 100V to 240V, 50Hz or 60Hz. You'd think that projectors, since they contain a darn great light bulb, would be more likely to demand a particular mains voltage to feed that bulb – but you'd be wrong.

The short-arc lamps used in modern projectors don't run directly from mains voltage, so it's perfectly normal for projectors on the market today to be world-compatible. All you need is a power cable that terminates in the right kind of plug.

To run non-world-compatible gear in a country with half or twice the mains voltage, you need a step-down or step-up transformer; one that can run a projector will cost you a couple of hundred bucks. But, as I said, you very probably won't need one.

Radiatin' RADEON

I I recently took the major hop from a 1GHz Duron and GeForce4 MX440 to an Athlon 64 2800+ and PowerColor RADEON 9800XT. The problem is, this toasty RADEON is sitting at 58°C idle, and I've seen it get to 72°C under full load, even with this massive copper slab on it!

Is this normal? All my other temp readings are fine, CPU is at 38°C, case at 24°C. What do you suggest to cool it down? I can't have these temps much longer.

Tyler Watson

O Note, starting out, that all of your computer's temperature readings come from sensors that may or may not be accurate.

That said – yes, a lot of RADEONs run pretty warm, and 72°C isn't amazing for a 9800XT in a normally ventilated case, with a comfortable external ambient temperature.

My standard rule about apparently alarming silicon temperatures applies. If the system hangs, and if taking the side of the case off and pointing a desk fan in there stops it hanging, then better cooling is in order. In the absence of mysterious crashes (or in the presence of only very occasional mysterious crashes...), don't worry about it.

The best way to reduce video card temperatures without ripping off the stock cooler, by the way, is to improve your case ventilation. More fans, or more powerful fans where the current ones are, or a hole in the side with an extra fan on it. None of these options are likely to leave you with a dead video card, while changing the card's own cooler certainly can.

ABOVE: Your video card must not only be cooled; it must be *impressively* cooled.

Like LOGO, only better

I I heard that current graphic cards are programmable and can be used for other than 3D rendering. I'm interested in encoding video (rather CPU intensive), and wondered if it's possible to program a GPU to do it?

Rashid Alias

> You'd think that projectors, since they contain a darn great light bulb, would demand a particular mains voltage...

O The problem is not just doing general tasks on GPUs in some painfully inefficient Turing-machine-ish way, which is unquestionably possible, but doing them fast enough to make it worth the effort. The current state of general purpose GPU programming isn't close to achieving this, though it *is* starting to get moving a bit. A couple of links you may find interesting: www.gpgpu.org, and www.slashdot.org/developers/04/09/20/1747210.shtml

Delete entire holiday? (Y/N)

I In a previous *I/O*, you explained how data can be recovered from a hard disk that has been formatted. Could the same process be used to recover data from Flash RAM cards (eg, SD or CompactFlash cards, or even thumbdrives)?

I'm not sure on how they work, so I was wondering how different they are from hard disks.

Morris Umali

O Flash memory's quite different from hard disk storage at the basic level, of course, but once you start putting regular PC filesystems onto Flash devices, you can also use regular data recovery software on them, often with excellent results.

There are some specialised digital photo recovery packages that may or may not be any more use than general purpose data recovery software for these tasks, but one freeware program that I know has given good results on munged CompactFlash cards in the past is PC Inspector: www.pcinspector.de/file_recovery/UK/welcome.htm

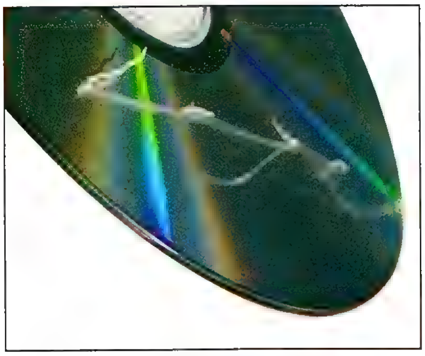
Scratch mix

I I've gone and scratched a DVD, before I even watched it (or backed it up). The scratch is on the bottom side (I know that label-side scratches are often unfixable), so I should be able to get one of those repair kits with buffers and special polish and stuff to fix the problem. But the kits always seem to be pretty expensive and good for only about three discs, or even more expensive and good for about a 100 more discs than I ever expect to scratch.

Surely there's some cheap household product I can use instead. I've heard that you can buff out scratches with toothpaste; is that true?

Phil Middleton

O Yes, plain white toothpaste (with as few fancy additives and coloured gel stripes and such as you can manage) *will* work as a gentle buffing compound for plastics. But there are better options. I've dealt with moderate scratches with metal polish, rubbed on with tissues, to cut the polycarbonate around the scratch down to its level; next, a wipe of clear furniture polish will fill the mild scuff mark the abrasive left. I used Brasso and Mr Sheen, but I'm sure there are plenty of similar products that'll work.



ABOVE: Your mission, should you choose to accept it...

Juice-ometer

I I'm currently using a microATX case with a 200W no-name PSU. I'm running more gear than this little PSU probably expects, though. Is there a way that I can accurately measure how much the PSU is drawing at any given time?

Zac

O There are a few ways to do this.

One is easy and risk-free: buy a power meter that displays how much power is being drawn by stuff plugged into it. These things aren't cheap. Make friends with someone at your local university electrical labs and you may get access to one for free.

Another is less easy, but still pretty much risk-free: unplug and/or turn off everything in your abode that you can, then go to the junction box and see how fast the meter is ticking over.

Now turn on the PC and set it up running whatever looping tests you like, and go back to the junction box, and see how much faster the disc's spinning. Bingo, an accurate-enough-for-the-electricity-company figure on the watts being drawn by the computer – provided you didn't forget about a fridge, or something.

The only other technique that carries zero electrocution risk is, unfortunately, impractical; it involves clipping a DC current clamp meter (a non-invasive kind of meter; you just clip it onto the wire like a clothes-peg) on every separate positive output wire from the PSU (only one wire at a time can be monitored by one meter).

If the load's constant then you could clamp one wire after another, but the only way to really make this practicable is to crack the PSU casing [ELECTROCUTION ALERT!] and monitor each rail individually, which would require a certain amount of cable-wrangling inside.

If, by some miracle, you managed to actually do this, you'd know what the PSU was delivering with a high degree of accuracy; multiply current on each wire by its nominal voltage and you're done.

Another option is to use an AC current clamp meter on the active wire leading to the PSU (or the neutral wire coming back). To do this, you'd have to slit the insulation on the mains lead [ELECTROCUTION ALERT!] and tease out the appropriate conductor to clip the meter onto (you can't clip it onto the whole cable; with one wire going out and one coming back, you'll get a zero reading).

The results from this aren't very straightforward, though, because even if you've got a fancy Root Mean Square (RMS) current meter that compensates for screwy waveform stuff created by most switchmode PSUs, you'll still only be measuring the current in the wire, and multiplying that by the line voltage won't give you the power being drawn by the PSU, thanks to the lousy power factor that most PSUs have.

If you know the power factor of the PSU, you can get the real power draw. Multiply that by the PSU efficiency (another thing that you'll need to discover, perhaps by divine revelation...) and you get the power it's outputting to the PC. Your household electricity meter should compensate for all this quite well, which is why using it instead is a much more practical option.

A cheaper version of the above test is to splice a multimeter that can measure RMS amps in-line with the active or neutral wires of the power cord [BIG ELECTROCUTION ALERT!] DR

Simon Peppercorn dons his pants of tweakology to help you make the most of Microsoft's OS.

Snapping into control

The XP/2K Control Panels allows you to access a number of administrative tools for managing your system. These are nothing more than management consoles, preconfigured with the relevant snap-ins. You can also create your management console and customise the various components you want to administer.

To do so launch 'mmc.exe' from the Run command box. This will open the Microsoft Management Console (MMC) and if you haven't played here before, it will probably be empty. On the left side is the console tree. It contains the snap-ins which have been added for the console.

Click on File/Add Remove Snap-ins then the Add button. You can then go on to choose from a list of standalone snap-ins, such as 'Local Users and Groups', 'Event Viewer', 'Shared Folders' and other management or monitoring tools. You can also add links to web pages, which open within the console. A small description of each snap-in will help you decide which ones you want to use, so select one and click 'Add'. Then another, and another and so on.

Depending on the snap-ins you select, you will be prompted to select whether you want to use this snap-in on the local computer or a remote computer (provided you have the right permissions on the remote computer), so you simply need to follow the prompts.

The 'Extensions' tab allow you to specify which extensions you want to allow for snap-ins which actually have extensions, such as 'Computer Management.

When you have added the snap-ins you want, save the console – the desktop would be a handy place. When you want to use the customised console, just launch the file you saved. If you want to edit the console, go right ahead, or alternatively create multiple consoles depending on your needs.

Snap-ins are extremely powerful when it comes to managing your system. From within the MMC, you can edit security templates and the like, so you may want to consider restricting access to such implements of badness.

There are various ways of doing this but a relatively quick and nasty fix is to edit the registry value HKEY_CURRENT_USER\Software\Policies\Microsoft\MMC and create a new DWORD value, if it doesn't already exist, called 'RestrictToPermitted Snapins'. A value of '1' will enable restrict access to all snap-ins other than those snap-ins that have been explicitly allowed through group policies.

Many of the individual snap-ins can be launched directly within a console by typing the relevant command into a command prompt:

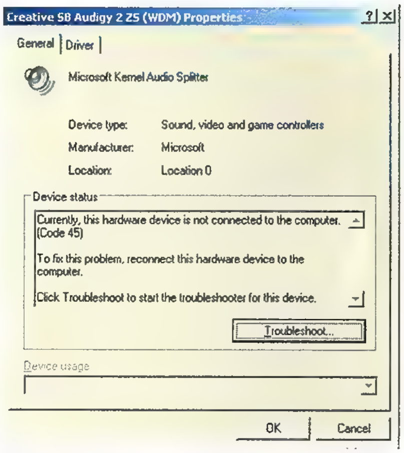
Users and Groups – lusrmgr.msc
Device Manager – devmgmt.msc
Component Services – comexp.msc
Event Viewer – eventvwr.msc
Shared Folders – fsmgmt.msc
Group Policies – gpedit.msc
Performance Monitor – perfmon.msc
Disk Defrag – dfrg.msc
Local Security Settings – secpol.msc
Resultant Set of Policies – rsop.msc
Disk Managment – diskmgmt.msc
Services – services.msc

Ghosts of hardware past

Over the life of your PC various components may have be installed and later removed. Hardware such as sound cards, modems, and network adaptors may find a successful path in and out of your computer.

Just because you have removed the hardware doesn't mean that the drivers aren't still being loaded, and still consuming resources. If the device is no longer present, Device Manager may just not be displaying an entry for it, hiding the ability to properly uninstall it.

We can instruct Device Manager to show all devices it knows about by creating an Environment Variable. Right click on 'My Computer' then click on 'Properties' (or double click on the 'System' icon in the Control Panel). Go to the 'Advanced' tab and click on the Environment Variables button. You then need to click New to create a new System Variable and enter DEVMGR_SHOW_NONPRESENT_DEVICES and give it a value of '1'.



Microsoft Kernel Audio Splitter

Device type: Sound, video and game controllers
Manufacturer: Microsoft
Location: Location 0

Device status

Currently, this hardware device is not connected to the computer. (Code 45)

To fix this problem, reconnect this hardware device to the computer.

Click Troubleshoot to start the troubleshooter for this device.

Device usage

ABOVE: Now you can discover old, hidden drivers like this and remove them.

Back in Device Manager, select Show Hidden Devices. You should now be able to manage all the devices that are no longer physically present. If you see a device which is ghosted out, right click on it and look at the properties. You may see a message saying that the device is not connected to the computer. If the device is indeed not connected, and you have no further use for it, then go ahead and uninstall it through Device Manager. Don't go nuts though. If you don't know what you are uninstalling, then leave it be. Or, take the punt and hope you have a recent restore point to recover from.

Open Sesame.doc

When you right click on most files in Windows XP, the 'Open With' option appears. Windows naturally creates an association between file types and various compatible applications. Depending on the applications you have installed, or previously chosen to open that file type with, the number of choices can become ungainly. You may wish to remove redundant entries. This can be done by simply heading to the registry key HKEY_CURRENT_USERSoftwareMicrosoft WindowsCurrentVersionExplorerFileExts and delete the unwanted entries.

To restore an Open With application option, simply recreate the association through the Open With dialog box.

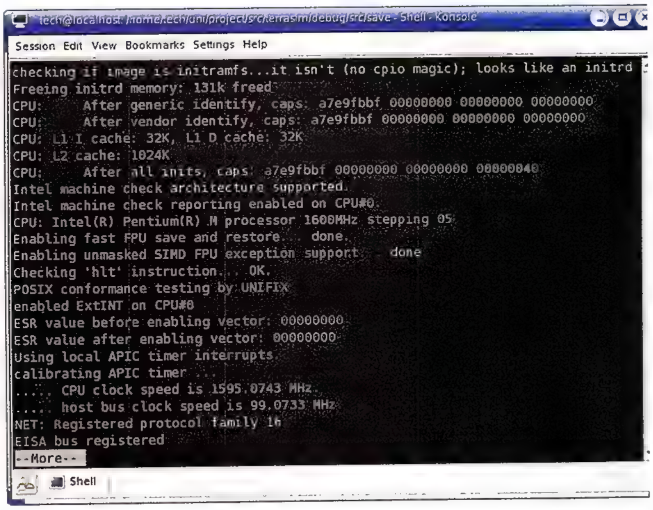
windowstweaks@atomicmpc.com.au

Peter Sbarski digs deep with dmesg and Intel's C compiler to help you maximise your Linux experience.

dmesg

The `dmesg` main page describes it as a utility that can be used 'to examine or control the kernel ring buffer'. While it is an accurate and succinct description of what `dmesg` can do it is not a very good one. In fact `dmesg` is a very useful utility and it should be given a more descriptive explanation.

The kernel can, very roughly, be described as the interface that sits between the hardware and other software (low level hardware interfacing). It allows software to send messages to hardware and vice versa. In order to achieve this, the kernel must be able to identify the hardware and know how to communicate with it. Of course, it must be mentioned that this is not everything that the kernel does; it is also responsible for scheduling and resource management, memory management, security and many other functions.


tech@localhost: /home/tech/uni/project/src/terrasim/debug/src/save - Shell - Konsole
Session
Edit
View
Bookmarks
Settings
Help
Shell

```
checking if image is initramfs...it isn't (no cpio magic); looks like an initrd
Freeing initrd memory: 131k freed
CPU:     After generic identify, caps: a7e9fbbf 00000000 00000000 00000000
CPU:     After vendor identify, caps: a7e9fbbf 00000000 00000000 00000000
CPU: L1 I cache: 32K, L1 D cache: 32K
CPU: L2 cache: 1024K
CPU:     After all inits, caps: a7e9fbbf 00000000 00000000 00000040
Intel machine check architecture supported.
Intel machine check reporting enabled on CPU#0.
CPU: Intel(R) Pentium(R) M processor 1600MHz stepping 05
Enabling fast FPU save and restore... done.
Enabling unmasked SIMD FPU exception support... done
Checking 'hlt' instruction... OK.
POSIX conformance testing by UNIFIX
enabled ExtINT on CPU#0
ESR value before enabling vector: 00000000
ESR value after enabling vector: 00000000
Using local APIC timer interrupts.
calibrating APIC timer ...
..... CPU clock speed is 1595.0743 MHz.
..... host bus clock speed is 99.0733 MHz.
NET: Registered protocol family 16
EISA bus registered
--More--
```

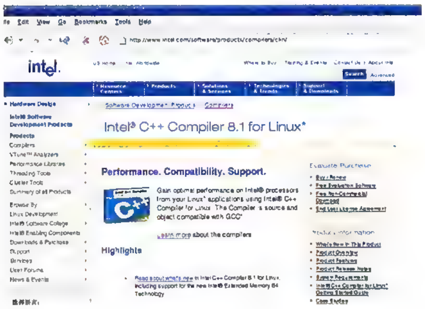
ABOVE: Typical dmesg output. Damn, Linux is sexy.

When Linux begins to boot, the kernel establishes control over hardware by loading inbuilt device drivers or external module drivers. Every piece of hardware is probed (identified) and an appropriate driver, if there is one, is loaded. The kernel also registers protocols, establishes network support (if it is setup to do so) and more. When this stage finishes `/sbin/init` takes over.

Any information outputted by the kernel goes into what's called the 'ring buffer'. The ring buffer isn't infinite in size so it will only be able to contain a certain amount of information. However for most standard distributions, its size is more than enough to store every message. The majority of distributions also print kernel messages to standard output (display) while the system boots. After the boot process is finished one can go over these messages by simply typing `dmesg` or `cat /var/log/dmesg`.

The printout from the `dmesg` command can be used in identifying hardware or kernel problems. For instance, if your scanner or printer or a TV tuner card wasn't recognised by the kernel you will most likely see a reference to it in one (or more) of the messages.

At first it may be a little hard to understand what the messages refer to but with experience it becomes easier and easier. As a simple example, if you find that your floppy drive isn't working, the first thing to do would be to check `dmesg`. You could traverse the whole list yourself or use `grep` like so: `dmesg | grep -i -n floppy`. The '-i' flag tells `grep` to ignore case, while the '-n' flag prints line numbers. If you see a message such as 'floppy0: no floppy controllers found' it means that the kernel searched for your floppy drive but couldn't find it. This usually happens when the drive is physically disconnected or its logic board is dead. And there you have it; you have just solved the mystery of the gradually disappearing floppy drive.


intel.
Intel® C++ Compiler 8.1 for Linux*
Performance. Compatibility. Support.
Highlights

ABOVE: ICC is free to download for non-commercial use.

You should never really rely on one message to pinpoint the problem. More often than not you have to look at a number of different messages to find out what is really going on. With `dmesg` you can also find out interesting information such as which hard drives were found (`dmesg | grep -i -n hd`) or how much memory was found and allocated (`dmesg | grep -i -n memory`). Finally `dmesg` is very useful if you add hardware or install new drivers. You can use it to check if the kernel can 'talk' to your new hardware and whether it was correctly identified.

ICC

The GNU Compiler Collection (GCC), initially created by Richard Stallman and then improved by countless individuals, has forever been Linux's flagship compiler and best friend. The very first Linux kernel was compiled with Stallman's excellent compiler and more than likely so has the kernel you are using right now. Nonetheless GCC is not the only C/C++ compiler available for the Linux platform. Intel C/C++ Compiler (ICC) is another one that can be used under Linux and it actually has some advantages over vanilla GCC. In fact, it's generally considered common knowledge that ICC can increase the performance of some kernel functions and programs by up to 30 percent for Intel based CPUs. Though of course these are notable exceptions and there are also some cases where ICC isn't as good as GCC.

Still in a lot of applications, particularly with Intel CPU's, ICC is usually worth the effort of installing it as your default compiler over GCC. If you want to try it out, Intel offers a free non-commercial version of ICC for download. You can find it at this link: www.intel.com/software/products/compilers/clin. If you need a little help getting it up and running, we'll cover doing this briefly next month.

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The wonders of Wi-Fi

Ashton Mills and Luke Gould take to the airwaves to show you how to optimise your wireless network for optimum performance.

Home networks, especially among the geek cognoscenti, have increased in popularity over of the past few years. This is mainly because of the uptake of broadband and cut rate networking gear from the generic companies we all know and love. And, as wireless becomes the new black, one technology in particular has managed to cling on to this trend – 802.11, particularly the 'b' and 'g' variants.

Commonly known as Wi-Fi, the wireless networking standard has managed to find its place in many homes and has helped satisfy the need to be mobile. It's often seen as a glorious expansion to your current network. Now you can finally frolic through the fields whilst playing Counter-Strike without that pesky Ethernet cable tripping you over.

But unfortunately this dream often comes crashing down when you set up your first wireless network. The marketroids throw around phrases like '150 feet range inside! Even through them wall thingies!' and '108Mb/s burger-flipping tongue tripping fun!' when, in reality, such ranges and speeds are simply not true.

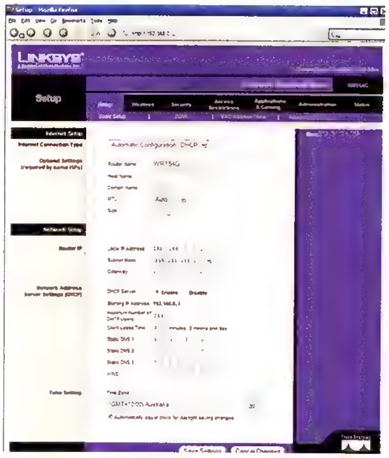
More than this, as some security experts are likely to point out, with greater convenience comes a greater security risk. And for Wi-Fi at least this can certainly be true. Broadcasting packets to the airwaves as is its nature, it's much easier for intruders to gain unauthorised access to your network.

So this month we're going to show you how to make the most of your wireless network by both optimising it for speed and setting up good security protocols to boot. Welcome to Wi-Fi, *Atomic* style.

Speedin' it up

There are two key elements which impact the effectiveness of your wireless network – coverage and speed. As you know, the 802.11b and 802.11g standards are transmitted on the internationally free 2.4GHz frequency band. Like all radio signals, interference will degrade signal quality and strength. Obstacles like walls, doors, furniture and large mysterious polished black obelisks will all have an effect on a signal. The fabric of these obstacles also has an effect – plasterboard walls will reduce the signal less than brick, glass has minimal impact so windows are fine, but metal will refract and reflect a signal. Also, other electrical devices that make use of the 2.4GHz band can also interfere, such as cordless phones, microwaves, and wireless keyboards and mice.

So, as you can see, depending on the location of your AP and the environment in which it is placed, your wireless network could be contending with a fair few obstacles which are preventing it from operating at maximum efficiency. To this end here are the key tips and tricks you can use to improve the performance and range of you wireless 802.11b and 802.11g networks.



Internet Connection Type: Automatic Configuration - DHCP

WRT54G

Auto

(GMT+10:00) Australia

ABOVE: The Linksys WRT54G, like most APs, utilises a browser interface for configuration.

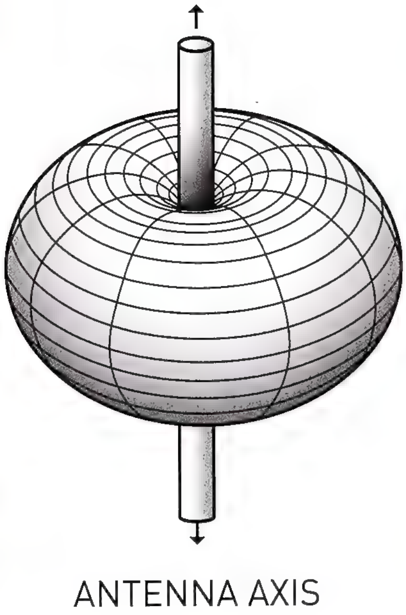
01 Position

Positioning of your wireless gear is important, especially the Access Point (AP). Naturally, it helps to place the AP equidistant to all the wireless clients in your netowrk, but what is often overlooked is that positioning can involve more than the relative 2D plane upon which the AP sits. Height can also be a big factor.

While ideal to have the AP on the same floor as the clients, this isn't always possible, or even desirable, for the home wireless network. Generally, wireless devices have no trouble penetrating a floor or two, but it comes at the cost of reduced signal strength and thus, ultimately, speed. However the actual signal emitted from an antenna forms more of a 'doughnut' around the axis of the antenna than the sphereical influence many people expect, and this means that you can achieve stronger signal strengths by correctly positioning the AP where its sinal penetration will be strongest, which isn't necessarily directly below or above it. Additionally, or alternatively, you can also experiment with the positioning of the antennas on an AP as well as the location of the AP itself.

It may all sound like common sense but often people unpack an AP and just place it whereever is convinient, rather than where it would be optimal *and* convinient.

So in summary the ideal position for the AP is equidistant to multiple or as close to single clients, on the same plane if possible, with as few obstructions as possible (and when you have them, choose a path of thinner materials), and with antennas positioned to take advantage of the signal shape. This is the single biggest change you can make to improve the speed and range of your network.



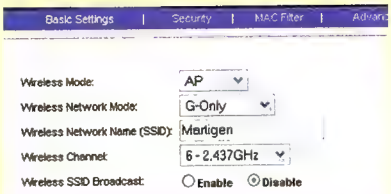
ABOVE: Signal distribution from a typical antenna.

02 Channel

As mentioned above, some devices and even other Wi-Fi gear can interfere with a signal because they operate on the same frequency band. To combat this try changing the transmission channel on your AP's setup page (usually accessed through a browser, check your AP's documentation). There are about 13 available channels so flick through each one and test the speed of each by doing some simple file transfers - we'll cover speed testing later in this tute.

Range shouldn't be affected by which channel you use unless there's a large amount of interference around some of the clients. Remember different clients might be near different types of interference, so test all your clients on each channel if you have the patience.

Be aware some APs refuse to operate on alternative channels without a lot of messing around, like the Apple Airport Express, so it really depends on the configurability of your hardware.



Wireless Mode: AP
Wireless Network Mode: G-Only
Wireless Network Name (SSID): Martigen
Wireless Channel: 6 - 2.437GHz
Wireless SSID Broadcast: ○ Enable ● Disable

ABOVE: Choosing a channel other than the default to avoid interference.

03 Antenna

If the channel is good and the AP is positioned in an optimal location – which still may not be perfect if it needs to be next to your broadband modem and router, for example – then what's your next option for increasing the signal strength and range? The answer is to replace or augment the antennas which, if you like building things, can even be fun.

Virtually all Wi-Fi gear uses an omni-directional antenna. Omni-directional antennas transmit their signal in a 360° arc, which is good enough for most indoor or close range situations but is very inefficient for longer distances or for penetrating through multiple obstacles.

You could use a directional or semi-directional antenna. As you can imagine directional and semi-directional antennas transmit in a limited arc and the smaller the arc the stronger the signal packed into it which, of course, translates to extended strength and range.

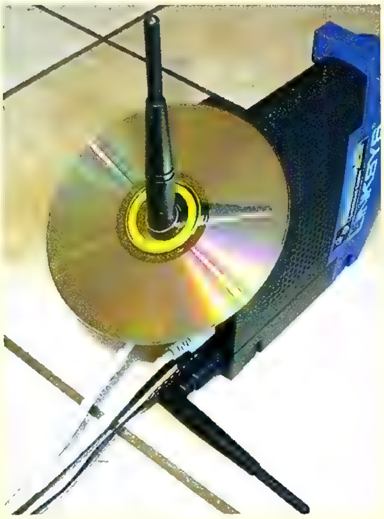
Using an FPS analogy, a shotgun has a shorter range but wider spread than, for example, a sniper rifle. Yep, you can rely on *Atomic* to explain technology through the engine of an FPS!

There are a large range of professional, pre-made antennas available for purchase, but these are usually expensive and some Wi-Fi equipment doesn't actually allow for the original antenna to be removed. This is obstensibly to prevent people attaching antennas capable of transmitting signals beyond the FCC recommendation.

Luckily there are some dirt cheap mods which can be put over your current antenna to do the trick. Many designs are available on the internet that you can build yourself out of cardboard and tin-foil (to reflect the signal), but we'll cover a simple mod anyone can do immediately here.

The CD Mod

- Get a clean CD or DVD, it doesn't matter if it's writeable or has already been burnt. Its reflective Aluminium layer is what we're after.
- Now for the highly technical and dangerous part: wear super-protective gloves and a face mask to protect yourself from the mind-beams and put the disc on the antenna so that the antenna goes through the centre hole of the disc.
- If necessary, employ the use of high calibre polymer backed adhesive-bonding material (otherwise known as 'sticky tape') to help secure the CD on the underside.
- Be amazed.
- Position the CD so the disc rests at an angle, and then position the AP itself in the direction of your client(s).
- Feel free to use a CD for each



ABOVE: The highly advanced 'CD' mod. Buy yours today!

BELOW: DIY antenna mods can greatly improve signal strength for stability, speed and range.

antenna – transmit and receive – to help maximise the performance of this highly technical hack.

As you've already gathered, the CD acts like a crude satellite dish thanks to the aluminium layer reflecting the signal along the plane of the CD. If you'd like to opt for more complex designs that you can build yourself, check out www.freeantennas.com. A popular example is the parabolic reflector, here: www.freeantennas.com/projects/template2

Securing your Network

By default, most APs broadcast your packets far and wide to practically anyone who wants to tune in and see just what you get up to on your PC.

So, naturally, it'd be nice if you could stop people from doing that.

APs come with a number of security features you can take advantage of to prevent both access to the network and the broadcast data itself, but by default these often not enabled. This means that, unless you have explicitly setup security on your AP then you are, right now, sharing with the outside world the contents of your hard drives as you copy data and the names of all those questionable sites you don't visit as you browse the web.

It's usually not enough to rely on the fact that your wireless network might be just short range, or not penetrate far outside of your walls, because it depends on a number factors such as the signal power of the AP, it's position, the materials of obstructions, your neighbours, and so on.

So if you haven't so far configured security settings for your wireless network, now is a very good time to do it.

01 Disable the SSID

This is the first step in preventing unauthorised access to your network, and will be present in the security settings section of the AP's configuration interface. Disabling SSID (Service Set IDentifier) broadcasts stops your AP sending the name of your network in its beacon. The beacon is a signal sent at a given interval to synchronise the wireless network.

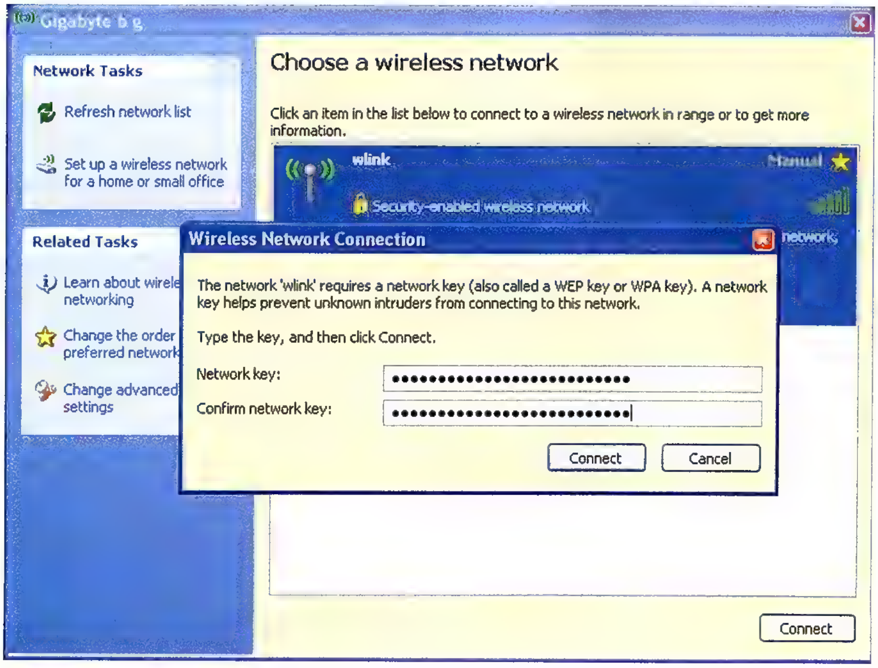
Note that disabling the SSID is only a very simple security through obscurity measure, and will only deter people idly scanning for networks. Users will need to manually enter the SSID of your network in order to connect, but this can be easily sniffed as clients who do know the SSID authenticate with the network.

Pros: Prevents unauthorised access; simple and quick; no speed impact.

Cons: Could be guessed; data can still be sniffed from the air.

02 Encrypt transmissions

All APs come with a variety of encryption and authentication mechanisms to help secure your data - by encrypting transmissions anyone sniffing the network will be unable to make use of the captured data.


Gigabyte b g
Network Tasks
Refresh network list
Set up a wireless network for a home or small office
Related Tasks
Learn about wirele networking
Change the order preferred network
Change advanced settings
wlink
Manual
Security-enabled wireless network
network
Wireless Network Connection
Connect
Cancel
Connect

Choose a wireless network

Click an item in the list below to connect to a wireless network in range or to get more information.

The network 'wlink' requires a network key (also called a WEP key or WPA key). A network key helps prevent unknown intruders from connecting to this network.

Type the key, and then click Connect.

Network key: ••••••••••••••••••••••••••

Confirm network key: ••••••••••••••••••••••••••

ABOVE: WEP makes use of a key each client needs to know to connect.

There are usually three types of encryption available - WEP 64-bit, WEP 128-bit and WPA. WEP (Wireless Encryption Protocol) 64-bit is supported by all 802.11b/g gear, but virtually everything supports its much stronger variant, WEP 128-bit. WPA (Wi-Fi Protected Access) is a newer, more secure form of encryption but isn't supported by all Wi-Fi gear at present. Support can sometimes be added via a firmware upgrade, but this depends on the vendor.

To use encryption you need to go to your AP's setup page, select the encryption type, and enter in a pass phrase. If you're using WEP, a key will be generated in the form of a hexadecimal string, while WPA just uses the pass phrase itself. Once activated, any client who tires to connect will be asked for the key, and if it's typed in correctly the client will be allowed to connect. Obviously WPA is slight nicer here in that it's easier to remember a phrase than a series of hexadecimal values, but for this there's always copy and paste!

Note that security through encryption comes at a price – the use of encryptions adds to the size of the packets being sent, and thus uses a portion of the available bandwidth. Roughly some 200-300KB/s can be taken off the maximum transfer rate for a strong signal. This is not too bad for 802.11g networks, as they run relatively fast, but 802.11b networks may feel the pinch as the average speed is a mere 700KB/s.

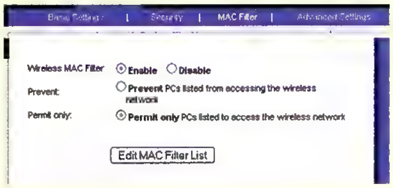
Also, WEP isn't unbreakable, but it would require an awful lot of CPU grunt not to mention intruders needing to capture many gigs of transmissions in order to find patterns to crack. Ultimately, it's nothing changing your key regularly won't fix if you're really concerned.

Pros: Prevents unauthorised access and intelligible sniffing of data.

Cons: Performance hit.

03 Enable Mac Filtering

The last security method you should employ is MAC filtering, and unless you're trying to run a public AP, there's absolutely no reason not to be doing this.



Wireless MAC Filter ● Enable ○ Disable
Prevent: ○ **Prevent** PCs listed from accessing the wireless network
Permit only: ● **Permit only** PCs listed to access the wireless network

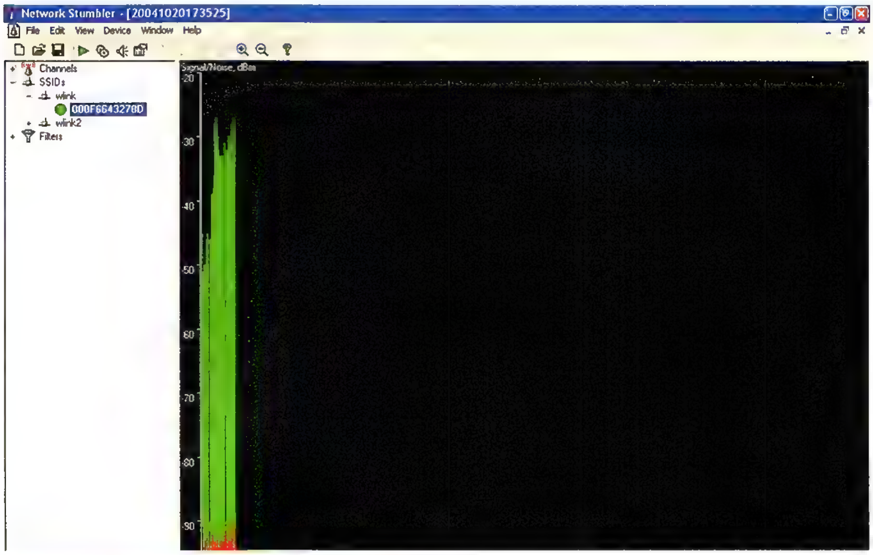
ABOVE: Enabling MAC filtering on the AP allows you to control precisely who can and cannot connect.

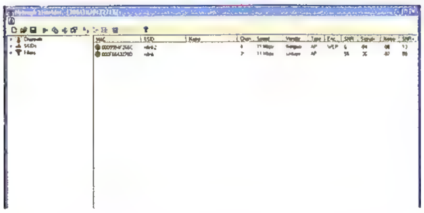
As you're probably aware each networking device – wired or wireless – has a unique identifier known as a MAC (Media Access Control) address. Most APs support the ability to filter access to the AP based on MAC address.

You can therefore type in the MAC addresses of only those clients you want to connect to the AP, and it doesn't matter if your SSID is discovered or even if your WEP pass phrase is cracked - if the client has the wrong MAC address, it simply won't be granted access.

You can find out the MAC address of the wireless cards in your machines by right clicking on the network icon in your Tray, selecting Status —> Support —> Details and writing down the value for 'Physical Address'. If the card isn't currently active, open up a command prompt and type:`ipconfig /all` to see the same information.

Using MAC filtering is the most secure way to restrict access to the AP, as it's nigh impossible for an intruder to guess the MAC address any client machines. This doesn't, however, have any impact on the broadcast data itself; it's still necessary to encrypt transmissions with WEP or WPA.





ABOVE AND LEFT: Netstumbler is ideal for finding and monitoring the status of wireless networks

Pros: Effectively prevents unauthorised access; no performance hit.
Cons: Doesn't prevent packet sniffing.

04 Benchmarking and monitoring your network

It's all well and good to have your wireless wonder setup for speed and security, but how can you measure just how effective your changes have been?

As it happens there are a number of freely available applications you can use to do just this.

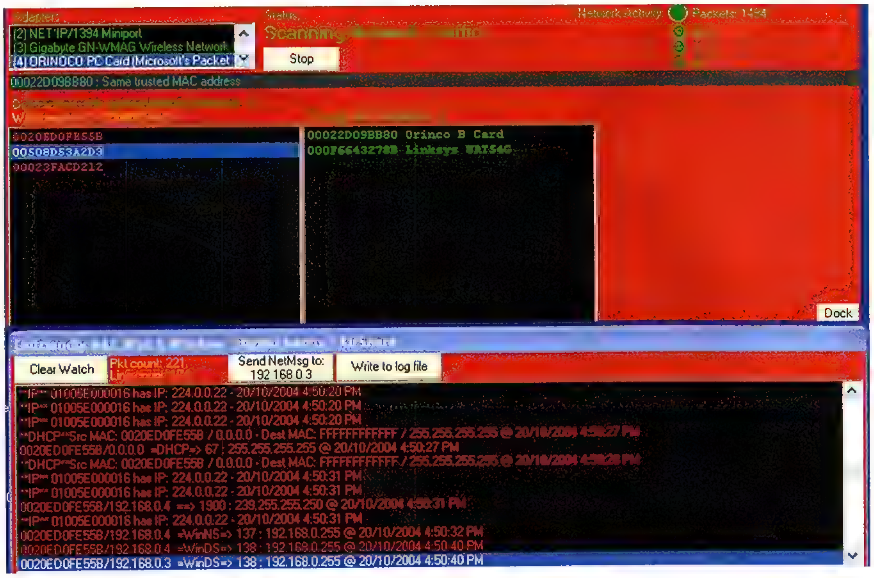
Netstumbler

Netstumbler (www.netstumbler.com) is a nice and easy tool to find out the signal strength of wireless networks within range. It automatically refreshes at a fast rate, so it's easy to use whilst walking or driving – which is exactly what wardrivers do.

Netstumbler is very user friendly, and when it finds a network it will list it on screen, showing all available details of that network including broadcast name and wether WEP or WPA is being used.

By far its most useful feature is to monitor the signal strength of the networks it can see. You'll find that the lowest speed you can expect for weak but stable signal strengths will be approximately 100KB/s for 802.11b networks and 300KB/s for 802.11g. Maximum at full signal strength should be in the range of 600KB/s for 802.11b and 2.4MB/s 802.11g. Naturally, if you're using one of those new fangled '108Mb/s' 802.11g networks over the usual 54Mb/s standard, which is usually achieved by banding two channels together in the hardware, you can expect even faster speeds.

It should be noted that netstumbler allows others to easily scan and find your network (should it be reachable outside, on a local road for example). This shouldn't be a problem as long at least one of the previously mentioned security methods are in place on your network.



```
(2) NET IP/1394 Miniport
(3) Gigabyte GN-WMAG Wireless Network
(4) ORINOCO PC Card (Microsoft's Packet
```

```
00022D09BB80 : Same trusted MAC address
```

```
0020ED0FE55B
00508D53A2D3
00023FACD212
```

```
00022D09BB80 Orinco B Card
000F6643278B Linksys WRT54G
```

```
**IP** 01005E000016 has IP: 224.0.0.22 - 20/10/2004 4:50:20 PM
**IP** 01005E000016 has IP: 224.0.0.22 - 20/10/2004 4:50:20 PM
**IP** 01005E000016 has IP: 224.0.0.22 - 20/10/2004 4:50:20 PM
**DHCP**Src MAC: 0020ED0FE558 / 0.0.0.0 - Dest MAC: FFFFFFFFFFFF / 255.255.255.255 @ 20/10/2004 4:50:27 PM
0020ED0FE558/0.0.0.0 =DHCP=> 67 : 255.255.255.255 @ 20/10/2004 4:50:27 PM
**DHCP**Src MAC: 0020ED0FE558 / 0.0.0.0 - Dest MAC: FFFFFFFFFFFF / 255.255.255.255 @ 20/10/2004 4:50:28 PM
**IP** 01005E000016 has IP: 224.0.0.22 - 20/10/2004 4:50:31 PM
**IP** 01005E000016 has IP: 224.0.0.22 - 20/10/2004 4:50:31 PM
0020ED0FE558/192.168.0.4 ==> 1900 : 239.255.255.250 @ 20/10/2004 4:50:31 PM
**IP** 01005E000016 has IP: 224.0.0.22 - 20/10/2004 4:50:31 PM
0020ED0FE558/192.168.0.4 =WinNS=> 137 : 192.168.0.255 @ 20/10/2004 4:50:32 PM
0020ED0FE558/192.168.0.4 =WinDS=> 138 : 192.168.0.255 @ 20/10/2004 4:50:40 PM
0020ED0FE558/192.168.0.3 =WinDS=> 138 : 192.168.0.255 @ 20/10/2004 4:50:40 PM
```

ABOVE: AirSnare is a handy tool for capturing the packets of wireless networks.

AirSnare

Air snare (home.comcast.net/~jay.deboer/airsnare) supports most popular chipsets and needs access to a network in order to see what's going on.

When a client connects AirSnare will list all the network traffic being sent and received, such as the port, destination IP and the time. For those Linux gurus among you, it's very much like running [code]tcpdump[/code] on a wired LAN. Sound notifications can be used and it can even email you about any problems!

AiroDump and AirCrack

These two applications have a bit of a dark side to them. The first, AiroDump, is used to sniff wireless packets even when not connected to a network. If encryption isn't used packets can be captured and analysed later.

If encryption *is* being used, this is where AirCrack comes in. AirCrack is a key cracker and, using the encrypted data captured from a WEP encrypted network using AiroDump, can given time determine the key of a wireless network.

But don't start running madly and buying WPA compatible gear just yet. While WEP is crackable, it'll take a long time to process. AirCrack only needs about 60MB worth of captured data to be able to crack the key, but this will take a very, very long time to complete. If a very large amount of data is captured though, (eg: 7GB) then the process won't take long at all. This is why MAC filtering is important, because even if someone should crack your WEP key, they still can't access the network if they don't know the list of acceptable MAC addresses your AP accepts.

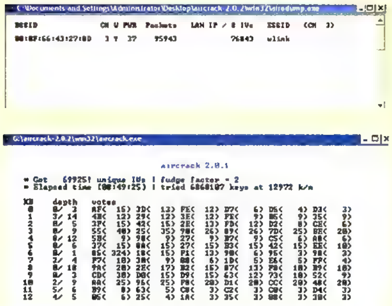
There are many more tools available for Linux than Windows if you wish to play further with wireless signal detection and analysis. Use these tools to measure just how secure your security protocols and network really is. If you've implemented the aforementioned security steps, you should find your network safe and sound from prying antennas.

Conclusion

Vendors of wireless APs are continually improving their gear – 108MB/s 802.11g equipment is already available, and new firmwares are regularly released for existing gear to fix bugs or add new features.

But what about that perennial question, does wireless impact ping? Despite the overheads of the 802.11 protocol and features like WEP, the answer is no.

You'll get the same less than 1ms response times as wired, so you can game away happy in the knowledge that your network is fast, as well as free from the bondage of wires.



ABOVE: AirDump and AirCrack are useful for testing the security of your (or somebody else's) network.

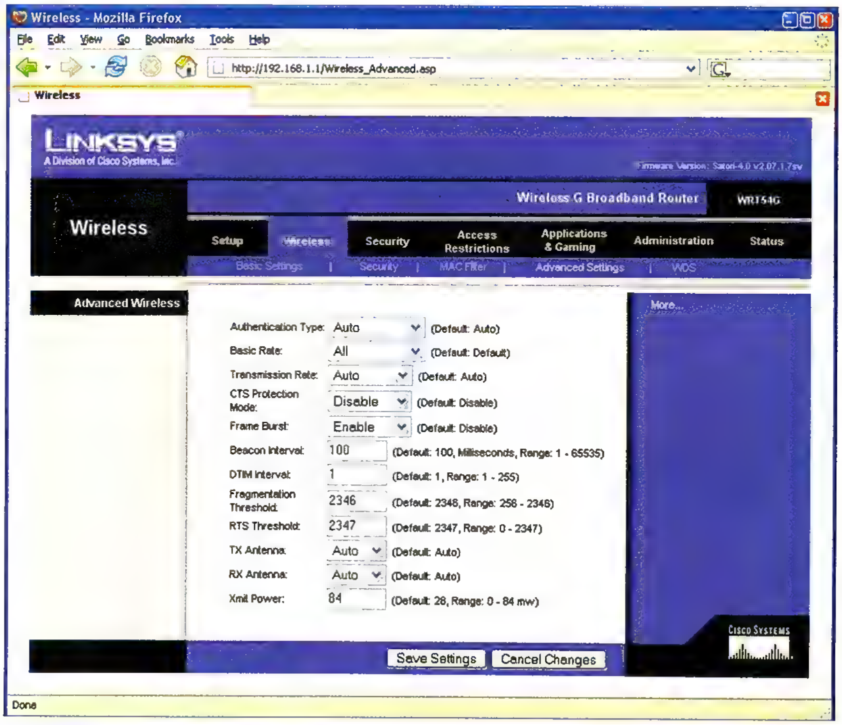
REAL THROUGHPUT SPEEDS

	Speed (MB/s)
10/100 Ethernet	8.8
G - No Encryption	2.5
G - WEP-64Bit	2.2
G - WEP-128Bit	2.2
G - WPA	2
B - No Encryption	0.6
B - WEP-64Bit	0.4
B - WEP-128Bit	0.4
B - WPA	n/a

ABOVE: Although 802.11g's raw throughput is up to 54Mb/s, due to protocol overheads the actual maximum real throughput is approximately 20Mb/s, and this is before extra overheads incurred by features such as WEP.

Hack me softly

Many AP's, especially all-in-one routers, have a cut down version of Linux running in them. Thanks to the GPL, companies using Linux have to supply the source code for their firmware. This has allowed for many modified firmwares packed full of extra features and options. These include telnet, internet access restrictions based on MAC, IP range and time and best of all higher transmission voltages - making it possible to create a more stable network or extend it further. The Linksys WRT54g and its 'gs' variant are currently the only models with such options, but hopefully other brands will release their source code as well. See www.linksysinfo.com for more info.



http://192.168.1.1/Wireless_Advanced.asp

Firmware Version: Satori-4.0 v2.07.1.7sv

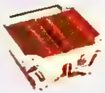
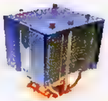
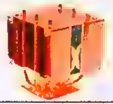
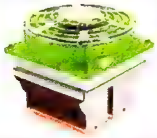
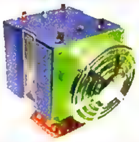
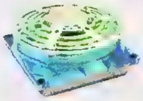
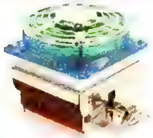
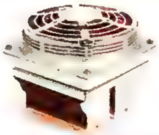
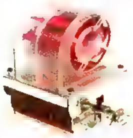
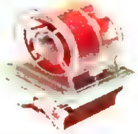
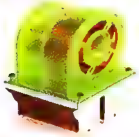
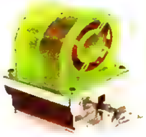
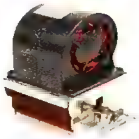
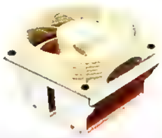
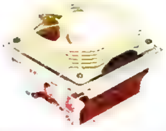
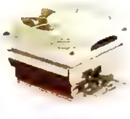
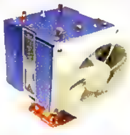
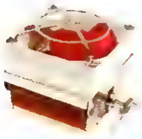
Authentication Type: Auto (Default: Auto)
Basic Rate: All (Default: Default)
Transmission Rate: Auto (Default: Auto)
CTS Protection Mode: Disable (Default: Disable)
Frame Burst: Enable (Default: Disable)
Beacon Interval: 100 (Default: 100, Milliseconds, Range: 1 - 65535)
DTIM Interval: 1 (Default: 1, Range: 1 - 255)
Fragmentation Threshold: 2346 (Default: 2346, Range: 256 - 2346)
RTS Threshold: 2347 (Default: 2347, Range: 0 - 2347)
TX Antenna: Auto (Default: Auto)
RX Antenna: Auto (Default: Auto)
Xmit Power: 84 (Default: 28, Range: 0 - 84 mw)

ABOVE: Some hacked firmwares allow you to increase the signal power of your AP which, when combined with a directional antenna or the simple CD mod, can greatly increase the reliability, speed, and range of your network.

Combo Cool
DIY by Yourself

Combo Cool DIY
Design Your Own CPU Cooler

At Thermaltake, we are frequently asked whether this fan can be connected to that heatsink. Now we have made it easier for you. Simply select a heatsink and a fan from the list below to design your own Combo Cool DIY CPU Cooler.

	GOLF325	HAMMER525	PIPE101	TOWER102	TOWER112
					
UFO#1		UFO#1 + Hammer525	UFO#1+ PIPE101		UFO#1 + TOWER112
UFO#2 	UFO#2 + GOLF325		UFO#2 + PIPE101	UFO#2 + TOWER102	
UFO#3		UFO#3 + Hammer525		UFO#3 + TOWER102	UFO#3 + TOWER112
XBPRO#1	XBPRO#1 + GOLF325			XBPRO#1 + TOWER102	XBPRO#1 + TOWER112
XBPRO#2			XBPRO#2 + PIPE101	XBPRO#2 + TOWER102	
XBPRO#3	XBPRO#3 + GOLF325		XBPRO#3 + PIPE101	XBPRO#3 + TOWER102	XBPRO#3 + TOWER112
Silent Cat 8CM		Silent Cat 8CM + Hammer525		Silent Cat 8CM + TOWER102	Silent Cat 8CM + TOWER112
Silent Cat 9CM	Silent Cat 9CM + GOLF325		Silent Cat 9CM + PIPE101		Silent Cat 9CM + TOWER112
Street Fighter	Street Fighter + GOLF325		Street Fighter + PIPE101	Street Fighter + TOWER102	Street Fighter + TOWER112

* Technical specifications available from www.thermaltake.com.au

* Fans can also be used as a case fan for total system cooling

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Photographic bling

Everyone likes to take happy snaps of their loved ones, sometimes even of their friends and family too. Daniel Rutter shows you how to make the memories last.

When you whip the silk sheet off your latest modified PC at the LAN party, strong men, or at least very good Counter-Strike players, weep openly at the beauty of your Dremeling.

Your LED spotlight placement and artful carving of automotive bog to perfectly recreate a selection of erotic Indian temple bas-reliefs leaves all who see it in a state of awe.

But when you take a picture of your glorious PC, it sucks. Submit it to *Hotbox* and our finely tuned Awful Image Detector routes it directly to the Lame folder. You were, afterall, born a case modding god and not necessarily a master of the photographic form.

Take heart. You can do better. We've had a number of requests for a quick guide on taking sexy shots, so here's the cheat sheet on photographing PCs and other toys, shiny and glowy or otherwise.

ABOVE: I like my backgrounds to be a whole bunch of nothing. You may prefer a picture of Conan the Barbarian.

01 Hardware

If you've got a film camera, it'll cost you a lot to learn to take these kinds of pictures. Digital cameras really, *really* help. You don't need a $2500 digital SLR, though, or a studio with 15 different backdrops and a bunch of reflector umbrellas. A four-year-old two megapixel digicam bought on eBay for $100 will probably be perfectly fine. You will need a few more cheap accessories to take good pictures, though:

A tripod – Cheap and nasty is OK. As long as it's got extensible legs and a pan-and-tilt head of some sort, you're in business. You'll need a tripod for long exposure shots, and to keep the framing of your shots the same when you're taking several in a row.

Lights – Yes, practically every digital camera comes with a forward-facing on-camera flash. Don't use it. If there's no other way to take a picture of your friends at a party then direct flash is a necessary evil, but when the light's pointing the same way as the lens, you lose the shadows that let you tell what shape things are.

That's why people's faces always look as flat as a frying pan in night-time happy snaps. On-camera flash is a recipe for industrial strength suck in almost all photos.

What you want is diffuse light, mostly from above. And that is what natural light usually looks like.

ABOVE: A thousand watts of good and instant sunshine.

The cheapest lighting option, therefore, *is* natural light. Direct sunlight is no good because it'll give you harsh shadows. On the other hand, diffuse sky-light through a window or light from an overcast sky are good. So is direct sunlight through a diffuser – and for this, a white bedsheet will do the job well enough, despite the fact it may look a little cheap. If you've got window light that only illuminates one side of your subject, put a big white thing – like another sheet – on the other side to reflect some light onto it.

Don't light one side with window light and the other with a lamp; the lamp-light will be much more yellow than the window-light.

If the sun isn't cooperating, head to the hardware store and buy one or more cheap 500 watt halogen flood lights. They'll heat up the room and their light is very yellow, but the price is right – you can buy replacement lamps in many supermarkets these days. White balance adjustment on digital cameras can deal with any single colour of light.

ABOVE: If your camera's automatic white balance gives you off-colour results, read the manual and find out how to set it to a mode that matches the light you're using, or how to set white balance manually by shooting a white thing before you shoot your subject.

If your camera can accept an accessory 'hot shoe' flash on top that you can aim upwards and bounce off a piece of white cardboard, then that'll give you good light without making you sweat. But the downside is that it probably won't be that cheap. Hardware store flood lights are definitely the penny-pincher's friend.

02 Depth of field, shutter speed, and all that jazz

Now we get a little technical, but bear with me and it'll all become clear.

Depth of field is the range of distances from the lens in which a subject will be in focus. When you're taking a picture of a computer case, you probably want it to be in focus from the nearest corner to the furthest one. This can be tricky, because the closer you focus, the shallower your depth of field becomes.

Note that the point you focus on should be one third of the way into the total depth of field. So don't focus on the nearest corner of the thing you're shooting. Focus into it a bit.

This is where aperture comes in – to get more depth of field out of a given lens, you have to make its aperture smaller. The aperture is the hole that lets the light in, and it's adjustable in every vaguely decent digital camera.

The problem with a smaller aperture, however, is that it also means less light is getting into the camera. So you need more light and/or longer *exposure* times (shutter speeds) to get as bright a picture as you would with a bigger aperture. You can also just crank up the camera's sensitivity (the 'ISO setting'), but that'll give you a grainier picture.

Long-ish exposure times are OK, though, if you've got a tripod. Modern digital cameras have no trouble with multi-second exposures, as long as you keep them still. If you find that pressing the shutter button jiggles the camera too much, and your camera doesn't have a remote control so you can trigger it without touching it, you can use the self-timer instead.

Apertures are always specified with the dreaded *F-stops* or F-numbers, which are the single photographic specification that's most guaranteed to make people's eyes glaze over. It pays to know basically what they are, though.

A lens's F-stop, or F-number, is its focal length divided by its aperture. Longer focal length means a narrower field of view – more zoom. Leave the aperture the same and zoom a lens to twice its previous focal length and its F-number will double.

F-numbers are useful not because they tell you about depth of field, but because they tell you about the amount of light that's making it to the camera's sensor. That affects the exposure time; half as much light means you need twice as long an exposure. The brightness of the image on the sensor is inversely proportional to the F-number squared, so f5.6 (say) requires four times as long a shutter speed as f2.8.

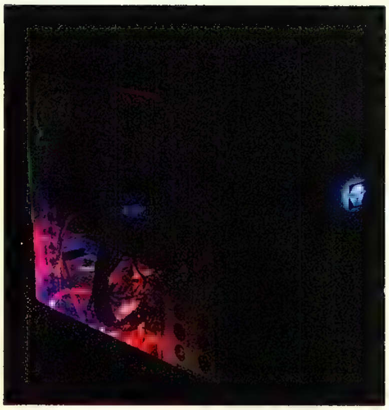
Consumer and 'prosumer' digital camera aperture settings generally only go up to about f8, which is not a very high F-number by the standards of 35mm cameras and digital SLRs. You still get good depth of field out of f8 on consumer cameras, though, because their sensors are very small compared with those of the bigger cameras. You also get the same exposure times as for f8 on any other camera – it's the best of both worlds.

Many consumer cameras don't give you complete manual control, but often feature 'aperture priority' where you select an aperture and the camera then chooses an appropriate shutter speed to match. With that and exposure adjustment (where you tell the camera to use a higher or lower exposure than it thinks is correct) you can effectively 'bracket' your shots, shooting a series of pictures with different exposures to get one that's just right. This is where having a digital camera is handy.

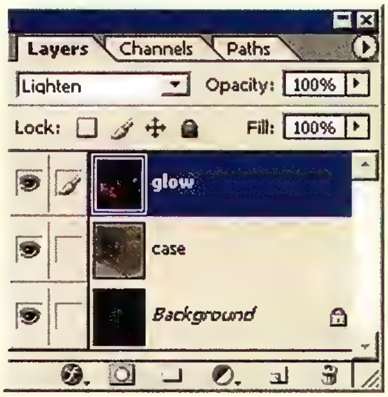
So, taking all the above – at f8 and the lowest ISO 100 sensitivity setting of most digital cameras, you might need a three second exposure with normal night-time indoor illumination to get a good shot. Point one 500 watt flood at the ceiling and that's likely to drop to about a quarter of a second. That's much too long for you to be able to hand-hold the camera and get a sharp picture – so a tripod is essential.

A quarter-second is also much too *short* for pretty much any digital camera to have any long-exposure image noise problems, which is a good thing.

ABOVE: The base image for a glowing-computer shot should be a little underexposed.



ABOVE: It's easy to accidentally overexpose small lights – check for featureless blocks of bright colour in the middle of them.



Lighten
Opacity: 100%
Fill: 100%
glow
case
Background

ABOVE: Lighten makes brighter pixels overwrite darker ones.

03 Getting clever

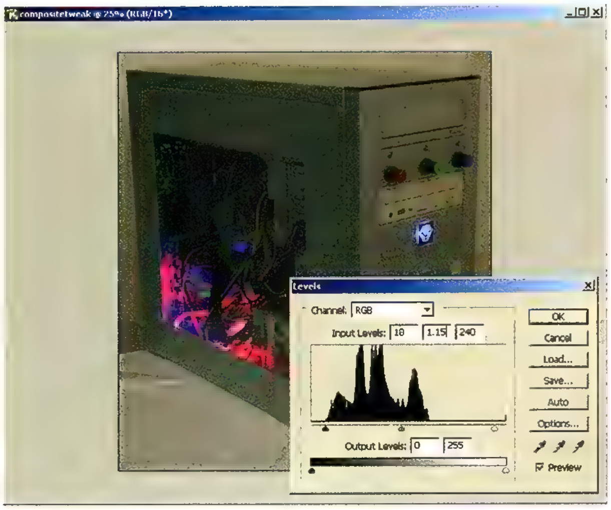
When you're photographing a thing with glowing parts – a modded PC, a monitor, an MP3 player – it's difficult to get the exposure right, because the glowing parts are often not bright enough. Expose them properly and the rest of the object will be too dark.

One way around this problem is to take one picture with the glowy stuff turned off, and everything else correctly exposed. In this case, 'correctly exposed' usually means 'a bit dark', for a realistic final result.

Next, take another picture with the glowy stuff turned on, and that is also correctly exposed.

Turn off the room lights for that one, to avoid unwanted reflections on side windows and such.

Next, composite the two images together. It's surprisingly easy to do this in any image manipulation program that lets you mix layers in creative ways; in Photoshop example make the lights image a layer above the other one, and



Channel: RGB

Input Levels: 18 1.15 240

Output Levels: 0 255

ABOVE: Learn to love Levels.

blend it with the 'Lighten' mode. You may need to jockey it around a little to line it up exactly if your tripod didn't stay perfectly still between pictures.

You can use this same trick to make great looking pictures of monitors. If you're photographing CRTs, though, make sure your exposure time is long enough that the monitor's refresh rate doesn't leave it with horizontal brighter and darker bars on the screen.

04 Post-processing

If you lack fancy studio gear and/or talent, it's a fact that the pictures coming out of your camera will not quite be ready for prime time.

Basic post-processing in a program like Photoshop (or the much more affordable Photoshop Elements, or the harder to use but completely free GIMP www.gimp.org) can turn an iffy picture into a great one.

Level adjustment is important. It lets you redefine the lightest and darkest tones in an image to eliminate a 'washed out' look, and it also lets you tweak midtone brightness (gamma), and even adjust colour balance. Most image editing software gives you an auto-levels feature that'll generally do an OK basic levels adjustment for you, but it's not hard to learn to adjust levels manually, by just fiddling around.

Also try playing with image contrast and colour saturation. Many consumer digital cameras punch up contrast and colour automatically, but if yours gives more 'professional' (AKA drab) results, you can fix it good and proper. If you want to give your picture a new background – plain black or white, a drop-shadow, a gradient, a bunch of Denebian slave girls – you are going to need to chop your subject out of the original background.

Doing this with computer cases is generally very easy, because they usually have quite simple straight edges.

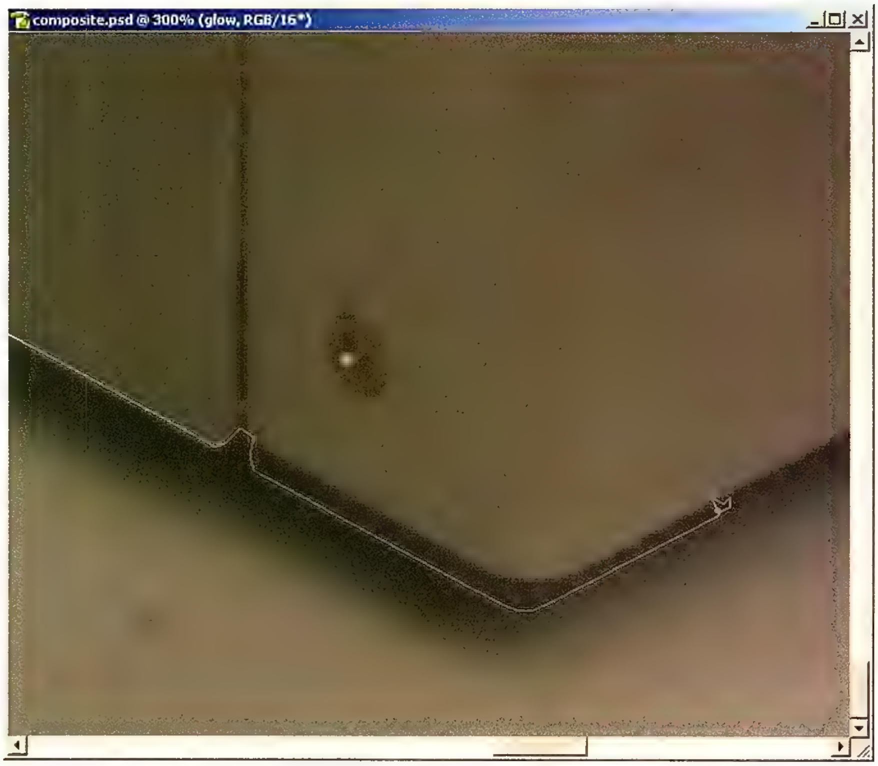
All you need to do is simply click your way around the edge, just inside the border, with a Lasso tool.

Then you can go on to experiment with different amounts of expansion and feathering of the selection, to avoid that cut-with-a-razor look when you copy the selected area and then paste it onto the new background.

I would definitely say it's a good idea to shoot the original picture on a background that's roughly the same colour as the background you're going to composite in later. If you can't do that, make sure the selection stays inside the edges of the object, even if you have to lose a little bit of the object all around to do it.

With these guidelines you'll be taking the type of shots of your beloved gear that you can frame and put on the bedside table, in your wallet and, naturally, submit to *Hobox*!

ABOVE: More colour, more contrast. Bling never looked so good!



ABOVE: Things with no curves are easy. Select the image outline and tweak to your liking.

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Everything tastes better when it's free. And when it's goodness from *Atomic* it's even better! So get your competition winning caps on and enter to win!

You can only enter once per competition or you'll be disqualified. You must provide a postal address and phone number for prize delivery when you enter (not a PO Box).

5 x four-litre Thermo-Electric Cooler and Warmer units + 5 x PC cigarette lighter panels

It has to be every person's dream to own a bar fridge that's small and convenient enough to have just an arm's length away. Enter the Thermo-Electric Cooler and Warmer, which in addition to being muchly able to sit at the end of one's arm length, can keep drinks both cold *and* warm! Thanks to PC Case Gear (www.pccasegear.com.au) for these lovely things!

What year was the first built-in refrigerator launched and by what company?

6x three-month subscriptions to Ragnarok Online + Ragnarok Online game CD

Join the everlasting Holy War between the Gods, humans and demons in Ragnarok Online. Sporting anime-style graphics and focusing on community and player interaction, this role-playing adventure gives you an array of different characters to choose from. Although it's currently a free game, this fantastic title won't be free forever so get your entries in fast to secure your place. Cheers to OnGameNet (www.ragnarok.com.au)!

What type of mythology did the name 'Ymir' come from and what was it?

2 x Logitech MX-1000 mice

Throw away your old roller ball and LED because laser is the new 'in thing' when it comes to mouse technology. The Logitech MX-1000 has *leaped* ahead of the rest with its laser cordless mouse. Twenty times more sensitive on a range of different surfaces and with a super sexy ergonomic design, this mouse will eat your cat for breakfast. Thanks to Logitech (www.logitech.com) for providing us woth two of these beauties to give away.

What were the names of the two mice in the Disney movie Cinderella who continued on to star with such celebrities as Mickey Mouse and Donald Duck?

2 x NEC 3500A dual-layer DVD burners.

Stuck in the old ages of single-layer DVDs, or even worse, CDs? Well, it's time to move on and meet NEC's blistering 3500A dual-layer DVD burner. Equipped with laser modulation for increased accuracy and the capacity to burn both +/- DVDs, this burner has been clocked burning dual-layer at 4x – almost double the paltry 2.4x speed of other DVD burner drives. Valued at $159 each, the i-Resources Group (www.i-rgroup.com) has given us two of these magnificent drives to dole out. So get your entries burning in to win.

What was the rating given to this product in last month's issue of *Atomic*?

EMAIL ENTRIES TO WIN@ATOMICMPC.COM.AU OR POST THEM TO: ATOMIC, PO BOX 2286, STRAWBERRY HILLS NSW 2012. PLEASE SEND A SEPARATE ENTRY FOR EACH COMPETITION. PLEASE ENSURE THE COMPETITION NAME IS THE SUBJECT OF THE EMAIL, OR IS DISPLAYED CLEARLY ON THE FRONT OF THE ENVELOPE. THE CLOSING DATE FOR ENTRIES IS 15 DECEMBER 2004. WINNERS WILL BE ANNOUNCED IN *ATOMIC 49*.

Atomic 45 winners: 10x Juiced PC. Q. What year was Acclaim founded? A. 1987. A. Ashford, Innisfail, QLD; A. Bardsley, Bentleigh, VIC; M. Whitney, Roma, QLD; D. Phillips, Southbank, VIC; S. Ha, Southbank, VIC; V. Swental, Cronulla, NSW; K. Loughnan, South Oakleigh, VIC; E. Bresson, Nailsworth, SA; R. Haku, Bondi Beach, NSW; Y. Dewar, Campbelltown, NSW. 5x Men of Valour PC. Q. What city in Oklahoma was 2015 founded in? A. Tulsa. S. Mediero, Mourilyan, QLD; C. Lee, Mascot, NSW; L. Hale, West Hobart, TAS; L. Nascimento, Bondi Junction, NSW; L. Rampini, Scarborough, QLD. 3x Star Trek: Voyager Season 3 DVDs. Q. What did a 1993 study from Purdue University find in relation to children and Star Trek? A. Children learn more about science from Star Trek than any other outside source. P. W. Soper, Palmerston North, NZ; B. Mason, Ningi, QLD; T. Smith, Coochiemudlo Island, QLD. 2x ZoneAlarm 5 Pro from Zone Labs. Q. Which surfaced first, the Melissa Macro virus or the Love You Letter virus and in what year? A. Melissa Macro virus in 1999. S. Jackson, Melton, VIC; D. Pok, Minto Heights, NSW.

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This month we have a bunch of Xbox tents to give away – four to be exact. Snuggle under the stars and enjoy the vibrant black and green of your console enclosure. Honestly, it does everything, from protecting you from rain and to providing shade from the sun!

So, if you have a subscription, you are, right now, already in the barrel of win with a good chance to claim a brilliant Xbox tent. However, if you're still moseying on down to your newsagents every month to fetch your copy of *Atomic* then count yourself out. The best way to count yourself in? Subscribe, by Jove!

Thanks to Xbox (*www.xbox.com.au*) for providing these portable palaces!

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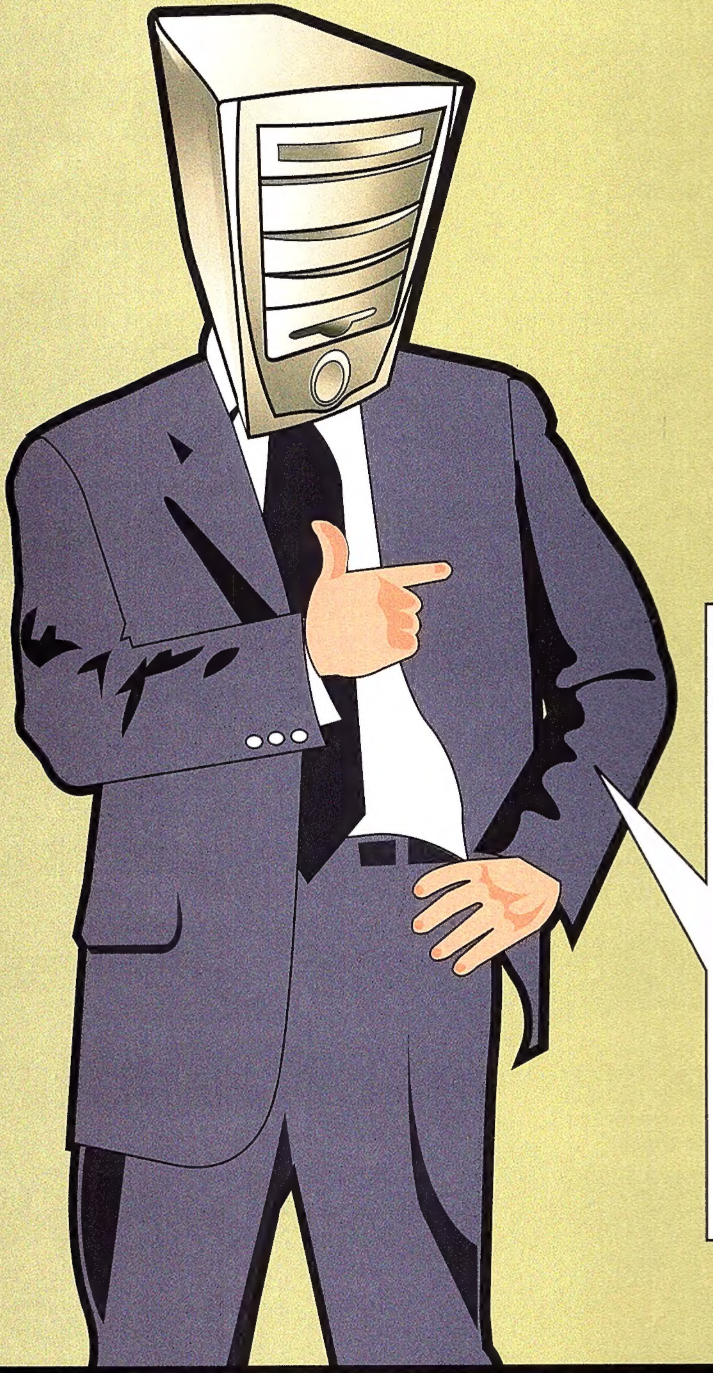

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FrisbeeMark XP

John Gillooly ponders the perplexities of benchmarking.

Benchmarking is no longer the instantly reliable thing it used to be, thanks to the constant poking, prodding and tweaking of drivers by the monolithic marketing arms of the hardware vendors.

While software based benchmarks are still valid, the need for an OS agnostic, replicable, scientistic evaluation of hardware performance is needed. So, *Atomic* developed a radical new testing methodology called FrisbeeMark.

It was natural to evolve this methodology. To this end we are proud to announce that the draft specification for FrisbeeMark XP is now complete. Unfortunately we had to remove a few features to get it into production; for instance, gone is the new file system we had been working on to ensure the weight of data was evenly distributed across the platters of drives being tested and our pipeline compensation program for graphics cards requires at least DirectX 8 support or above.

While the draft specification now exceeds 368 pages, not including appendices, we thought it prudent to provide some explanation of how this paradigm violating benchmark works. Our example is a comparative test between NVIDIA's GeForce 6800 Ultra and ATI's RADEON X800.

Both are 16 pipeline cards so we do not need to apply our reversal exponential pipeline count formula for compensation. However there is a radical difference in heatsink size and weight that can potentially skew results. To this end we compensate by averaging out the throw distance of the cards with and without stock cooling. In addition, noise levels are recorded as 'whooshmarks'. Recorded five metres from the thrower, this is a decibel reading of the rushing of the air as the card passes over our specially incorporated microphone.

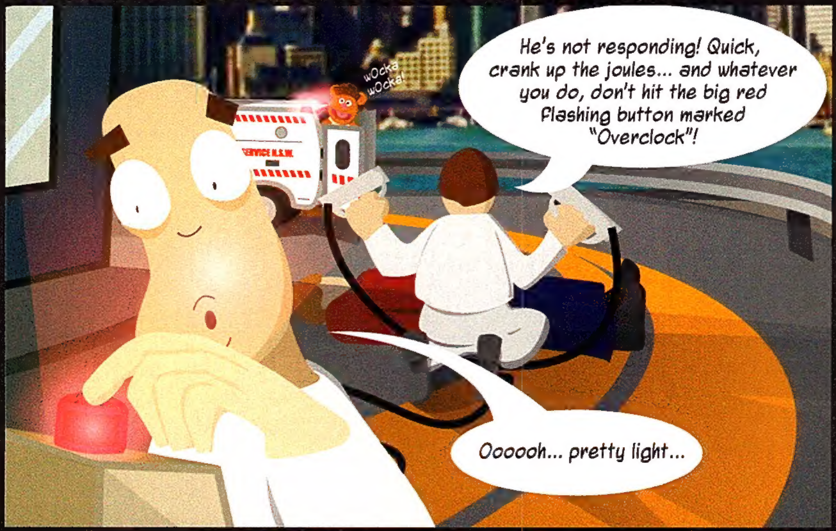
All the data is then passed through a special formula that spits out an end Frisbeemark number. In terms of a testing matrix, cards with compact design and medium weight but highly aerodynamic heatsinks are ideal, while large copper heatsinks or small stock coolers will ultimately severely impact a card's performance.

Our actual results have shown that it is not these obvious factors that are most important in attaining good FrisbeeMark scores. We have found that the major differentiating factors between the high end 3D offerings are not what more traditional benchmarks like 3DMark show.

Number and placement of Molex connections is one such factor. While the single connector offering that is the RADEON X800 XT PE scores highly in our TQ (throw quality) tests, thanks to the extra spin imparted by the asymmetric design, the dual molex configuration of the GeForce 6800 Ultra causes a slightly lower TQ but higher raw distance. This reinforces the picture painted by our software benchmarks.

Atomic is committed to slowly roll FrisbeeMark XP into its benchmarking by the date of April 1 2005. We admit that it is a risky move, but one that is in the best interest of the consumer. Welcome to the world of tomorrow.

Crashtest #20 - "Why Geeks Don't Make Good Paramedics", or "Red Rag to a Bull"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atomican

A recent milestone – the 100,000th post in *Atomic*'s PC Games Forum – was cause for fond reminiscing (www.atomicmpc.com.au/forums.asp?s=3&c=12&t=6273&p=0).

PC gaming set many on the path to geekdom... Games needed ever-faster framerates. Squeezing more clock cycles out of smouldering silicon led to hardware hacking. And hardware hacking ultimately led to *Atomic*.

While framerate-intensive first person shooters are gaming's *genre du jour*, the PC Forum's many threads about adventure gaming featured prominently in Atomicans' post-milestone musings.

Ihsan recalled spirited arguments about whether isometric games like Diablo are actually adventures. SexKitten noted that, in the many 'best games of all time' threads, adventure publishers Sierra usually featured. And Morris reflected on 'the day that adventure games died', when the sequels to Full Throttle and Sam & Max were cancelled.

Odder still, the *Atomic* Minesweeper tournaments of yesteryear were top of mind for RefuseResist.

Classical and Davidian disinterred the rotting carcass of the 'Half Life 2 countdown' thread. Forgotmaname displayed the scorch marks he received when admitting to leaving armoured vehicles on airfields in BF1942.

As eski pointed out in another thread (/forums.asp?s=3&c=12&t=6180) PC gamers are often accused of being nerds. But they're mostly too busy saving the earth from aliens, hostages from terrorists, or space marines from hellspawn, to worry about name-calling. Perhaps jocks who chase inflated pigskins should be the ones explaining themselves. Virt

POTM 47

Half Life 2 be damned. Doom schmoom. Conquer Rome? Been there, done that...

No, the real action on the New Game Front is right here at *Atomic*!

Yep. The Big One for Christmas is Weed Killer! Milano has posted some info and screenshots and we're all pre-caching it now. You can read all about it right here: www.atomicmpc.com.au/forums.asp?s=3&c=12

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